# AGRICULTURE AND CAPACITY BUILDING TOWARDS SUSTAINABLE DEVELOPMENT IN THE MALDIVES.

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Thesis submitted in total fulfilment of the requirements of the degree of Doctor of Philosophy

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April 2018

# ABSTRACT

The building of agricultural capacity through sustainable means is widely noted within the relevant literature relating to developing countries. Less so, is its coverage in the literature relating to small island developing states, specifically the Republic of Maldives. In addressing this lack of knowledge, this research seeks to provide an answer to the main research question: *How can farmers in the Maldives build agricultural capacity through sustainable means?*

In answering this question, this research employs a vigorous, robust, and original methodology comprising a multisite case study with a phenomenological line of inquiry. This inquiry undertakes interviews, discussions, and journal observations with farmers, government experts, and associated community members in order to investigate the sociocultural, economic, and environmental context of the farmers' agricultural experiences, and as importantly, what meanings the farmers derived from these experiences.

This research noted that despite the agricultural interventions by the Maldivian Ministry of Fisheries and Agriculture (MoFA), the key provider of agricultural assistance to farmers, their attempts to build sustainable agricultural capacity often resulted in unanticipated and disappointing intervention outcomes for farmers. The findings of this research revealed that intervention slippages occurred where there was insufficient traction between MoFA, its donor partners, and the intended beneficiary farmers. These slippages were invariably characterised by dysfunctional projects and disinterested participants. As an agriculturalist based in the Maldives, I had observed such phenomena first hand, but the question remained "Why"?

Analysis of the findings and relevant literature established where the intervention deficits resided, how they came about, and how best they could be addressed. This analysis was presented as a six-point farming framework that noted institutional interventions should be recalibrated with greater emphasis on the following: **the sociocultural island context in which agriculture is undertaken; the preference for individualistic farming activity; the capture and promotion of entrepreneurialism and profitability in agriculture; the inclusion of migrant agricultural labour as a valued resource; knowledge transfer to farmers, institutions, and youth; and, the production and marketing connectivity between farmers and factor and producer markets.** The research concluded that the opportunity for building sustainable capacity in agricultural practices resided within this framework.

# DECLARATION

This is to certify that:

1. the thesis comprises only my original work towards the PhD except where indicated

2. due acknowledgement has been made in the text to all other materials used

3. the word count for this thesis is 106,420 words exclusive of, tables, boxes, references and appendices.

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Paul Van Driessche

# DEDICATION

To all those hard-working farmers in the Maldives and those who are considering farming as an occupation in the future. I hope this thesis may assist your agricultural endeavours in some way and bring you the prosperity that you so richly deserve.

# ACKNOWLEDGEMENTS

My grateful thanks to all those farmers who gave willingly of their time in contributing to the data collection for this research. The rich description of their farming experiences was invaluable in revealing to me a greater understanding of the Maldivian agricultural story. To all those other participant contributors, I offer my deepest appreciation and thanks for your time, expertise and wisdom.

In the Maldives, I would like to offer particular thanks to Dr. Aminath Shafia, Dr. Abdulla Naseer, Dr. Shiham Adam, and Ms. Aishath Shifana all of whom were based in the Ministry of Fisheries and Agriculture for some of the time whilst this research was being undertaken. Further thanks to Muneeb Khalathil, who patiently and expertly dealt with my frequent IT enquiries. And special thanks also to all my friends in the Maldives who provided the encouragement to keep going and get it finished!

Elsewhere, thank you to James and Helen Dauris in Colombo, Kay Oliver, Hugh Wilson, Vicky Bennison and Billy McQueen in London, and of course Kay Green and my parents in rural Cambridgeshire, for providing entertainment and sustenance during my visits. Very special thanks also to Mary Smith who some forty-five years encouraged me to study.

A considerably large thank you to those at Bloomberg Philanthropies who supported my research and generously contributed funding towards its completion. Thank you again.

Finally, my very grateful thanks to my supervisor Dr. Zen Makuch who encouraged my progress from MPhil to PhD and provided pragmatic guidance and wholehearted support in completing my research journey. Thanks Zen.

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# ABBREVIATIONS

| | |
|---|---|
| ADB | Asian Development Bank |
| CSR | Corporate Social Responsibility |
| CBPO | Community Based Producer Organisations |
| DNP | Department of National Planning |
| EU/ACP | European Union / African, Caribbean and Pacific Group of States |
| FADiP | Fisheries and Agriculture Diversification Programme |
| FAO | United Nations Food and Agricultural Organisation |
| FFF | Farmer Framework Forum. |
| GDP | Gross Domestic Product |
| GoM | Government of Maldives |
| Ha. | Hectares |
| IFAD | International Fund for Agricultural Development |
| IIED | International Institute for Environment and Development |
| IMF | International Monetary Fund |
| IRIN | Integrated Regional Information Networks |
| kg | Kilograms |
| MoFA | Ministry of Fisheries and Agriculture |
| MVR | Maldivian Rufiyaa |
| NGO | Non-Governmental Organisation |
| PTAFRP | Post Tsunami Agricultural Fisheries Rehabilitation Programme |
| SIDS | Small Island Developing States |
| SME | Small to medium sized enterprise |
| UAE | United Arab Emirates |
| UNDP | United Nations Development Programme |
| UNFCCC | United Nations Framework Convention on Climate Change |
| UNICEF | United Nations Children's Fund |
| WDC | Women's Development Committee |
| WHO | World Health Organisation |
| WTO | World Trade Organisation |

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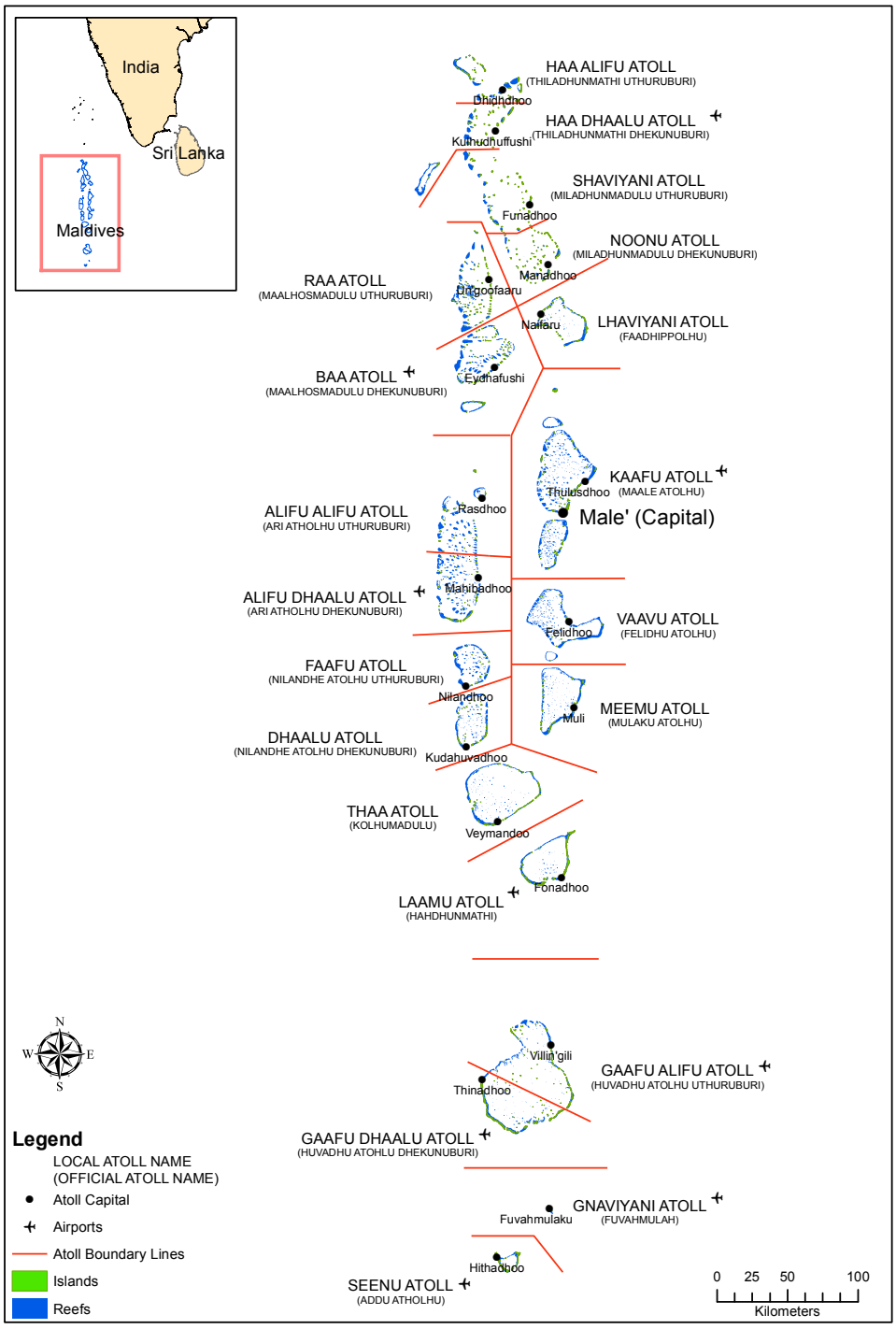
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**Figure 1. Map of the Maldives.**




*Source: Maldives Lands and Survey Authority, 2013.*

**Figure 2. From farm to fork.**

Husband and wife chili farmers utilising both conventional pot planting and shade cloth greenhouses provide produce to neighbouring resorts.



*Source: Paul Van Driessche*



*Source: Sakis, Dreamingofmaldives.com*

# Chapter 1. Introduction

## 1.1. Introducing the research

The traditional role of agriculture in Maldivian society had been one that provided valuable sustenance to remote island communities before the proliferation of food imports and improved transport connectivity. Unlike fishing which had mechanised its fishing fleets in the seventies, and tourism which had captured high end tourism in the eighties, agriculture had remained a largely subsistence activity conducted in home gardens and small field plots. Despite its lack of economic advancement, IFAD (2006) noted that agriculture was undertaken by an estimated two thirds of the population, contributing up to ten percent of the national food requirement. The remaining ninety percent balance of the national food requirement was made up from food imports (WTO, 2009).

In addressing the low agricultural productive output of the Maldives, this research looks at the institutional interventions designed to build sustainable capacity in agricultural practices, and how these interventions resonated with their intended beneficiaries, namely the Maldivian farmers. In doing this, a selection of agricultural stakeholders including the Maldivian Ministry of Fisheries and Agriculture (MoFA), its donor partners, the farmers and food customers, and associated community members, participated in interviews, discussions, and observations within a multisite case study. The multisite case study pursued a phenomenological line of inquiry in order to investigate the sociocultural, economic, and environmental context of the farmers' agricultural experiences, and as importantly, what meanings the farmers derived from these experiences. This was undertaken by firstly establishing the participants' baseline understanding of the terms 'sustainable agriculture', and 'building capacity in agriculture', followed by an examination of the key factors encountered by Maldivian farmers, and measures that could be taken in countering farming challenges. This approach addressed the main and supporting research questions:

Main research question:

- *How can farmers in the Maldives build agricultural capacity through sustainable means?*

Supporting questions:

- *What do farmers in the Maldives understand by the terms 'sustainable agriculture', and 'building capacity in agriculture'?*
- *What are the key factors encountered by farmers in the Maldives?*
- *What measures do farmers in the Maldives believe will help build their agricultural capacity through sustainable means?*

In setting the scene for investigating the context of Maldivian agriculture, IFAD (2017) noted the following:

> The development of the agriculture sector is limited due to the lack of land available for cultivation, poor soil conditions and a shortage of fresh water for irrigation. Except for coconut and fresh tuna, 90 per cent of all food items are imported. Heavy import dependency, limited storage facilities and ad hoc distribution systems potentially pose severe food security risks (IFAD, 2017, p.4)

Over the last fifteen years, MoFA and its donor partners have attempted to build sustainable capacity into agricultural practices in order to increase the productive output and marketing connectivity of farmers (MoFA, 2010). This was done in order to feed an expanding local, expatriate worker, and tourist population, and to lessen the reliance upon food imports (ibid). In doing this, MoFA pursued a series of interventions targeting assistance mainly to subsistent and semi subsistent farmers (IFAD, 2017). The interventions were characterised by capacity building in such areas as knowledge transfer, technology utilisation, and collectivised farming, all of which fell under a sustainability mantra espousing empowerment, gender focus, institutional strengthening, environmental conservation and natural resource management (IFAD, 2017; MoFA, 2010; FAO, 2012). However, many of the interventions proved to be unsustainable beyond their implementation phase resulting in poor outcomes characterised by dysfunctional projects and disinterested participants. In short, when the MoFA implementation period finished, many of the projects went into a terminal decline.

In commenting on the disappointing outcomes of such interventions, the International Fund for Agricultural Development (IFAD), one of MoFA's principal donor partners, noted of one of its main programmes, the Post Tsunami Agricultural and Fisheries Rehabilitation Programme (PTAFRP): "Support in the agricultural sector has had a very limited impact" (p.9) which was largely characterised by delay and failure (IFAD, 2017). This programme commenced in 2005, was revitalised in 2009-10 due to implementation delays, and concluded in 2013. IFAD (2017) further noted of this programme and its follow up

programme, the Fisheries and Agricultural Diversification Programme (FADiP) that the programme designs were poor with unrealistic objectives (IFAD, 2017). Both programmes were designed to enhance the farmers' productive capacity through collective structures such as cooperatives, and link these to markets, particularly in the tourist sector; FADiP was to develop value chains to facilitate improved market linkages (IFAD, 2006; IFAD, 2008). In a telling narrative that related to some aspects in this research, IFAD claimed that its PTAFRP programme was based on many false assumptions. These included:

> (i) The assumption that CBPOs [community-based producer organisations] were viable. This persisted despite the issues raised in the 2006 appraisal report, which made it clear that there are "no indigenous roots" for such cooperative organizations in Maldives. It was pointed out that communities were extremely wary about the possibility of cooperatives being used as rural financial intermediaries. Community activists believed that Maldivians were "very individualistic" and were "not interested in "cooperatives" and that this was a top-down donor-government initiative.
> (ii) The assumption that suitable people would be available for training and deployment as "facilitators" – "the core philosophy of the agriculture sub component" proved wrong.
> (v) The assumption that high-value agricultural products would find a ready market in the resort islands. This assumption ignored problems with transport and with guaranteeing regular supplies. Unless production reaches a suitable and consistent level, resorts are unwilling to enter into agreements with local producers and transport costs are high as the result of uncertain demand. (IFAD, 2017, p.15).

In view of the lack of traction between the institutional agricultural interventions and their intended beneficiaries, this research establishes a farming framework that seeks to inform agricultural policy and programming for building sustainable capacity in agricultural practices amongst farmers in the Maldives.

## 1.2. My position within the research

My association with agricultural development in the Maldives has spanned a twenty-year period comprising consultancy services for donor agencies such as the United Nations Development Programme, the International Finance Corporation, the Ministry of Fisheries and Agriculture / International Fund for Agricultural Development, and the private sector. The work undertaken with MoFA / IFAD has involved the building of production capacity through community-based producer organisations / cooperatives and the development of value chains linkages to the tourist sector market. During the institutional work undertaken, I noted that despite the interventions' offerings of training, technology, equipment, and pilot projects, considerable slippages occurred in the post implementation phase resulting in the demise of many of the programme projects. I was then curious to find what the farmers thought of MoFA's interventions with a view to identifying particular problems and suggested solutions.

My experience of working in the agricultural sector in the Maldives has informed me that MoFA's significant interventions were largely supported by donor input. Over the years this included: the 2005 Commercialisation of Agriculture in the Maldives strategy assisted by the Asian Development Bank (2005); the 2008 Support to Integrated Farming project assisted by the United Nation Development Programme (UNDP, 2013); the 2009 Fisheries and Agricultural Diversification Programme assisted by IFAD (IFAD, 2008); the 2011 drafting of the Plant Protection Act 12/2011 assisted by the Food and Agriculture Organisation (FAO, 2012a), and so forth.

In examining the interventions, I noted that most tended to focus on the economic uplifting of vulnerable groupings such as women, youth and low-income families, through their inclusion in farming activity. The inclusion of environmental conservation through natural resource management and the minimising of agricultural pollution was also noted within the interventions, but I observed, it was to a lesser extent than economic welfare. Further, I observed an exiguity of sociocultural considerations within the interventions. This propelled my deep curiosity into finding out whether the bolder inclusion of sociocultural considerations would make a difference to how farmers interpreted and used the interventions.

## 1.3. Research rationale.

This research focused on the theory that a recalibration of the MoFA interventions may be necessary to better accommodate the sociocultural context in which they sought to assist farmers. In exploring this theory, this research employed a qualitative research methodology which pursued a phenomenological line of enquiry situated within a multisite case study.

According to my knowledge, a multisite phenomenological research study into Maldivian agriculture has not been undertaken as evidenced by a lack of relevant scholarship relating to how farmers in the Maldives feel about their agricultural experiences, and what meaning they derived from these experiences. A further absence of knowledge explaining why farmers often pursued differing courses to those offered by institutional agricultural interventions designed to assist in agricultural capacity building is also evident. This research sought to fill these knowledge gaps by investigating what farmers thought about the lack of traction between themselves and institutional interventions, why this was occurring, and how it could be rectified. As noted by IFAD (2017) farmers were becoming increasingly

disinterested in participating in project interventions because of implementation delays, excessive and changing participation conditions, and a preference to rather do things their own way.

It was planned that the analysis in this research would provide a series of codes leading to the formation of a farming framework which could inform future agricultural policy and programming in the Maldives, and possibly further afield. In doing this, the methodology employed in collecting and analysing the data in this research was original in its design and execution. This multisite phenomenological line of enquiry into Maldivian farming conducted 147 semi structured interviews, twenty-seven focus group discussions, and 153 field journal observations, where farmers experiences were noted and analysed. This was then contrasted and compared with the relevant literature and my personal experiences of working with Maldivian agriculture with the aim of answering the research question.

## 1.4. Organisation of the thesis.

This thesis is divided into eight chapters as follows:

**Chapter one** introduces the research and my position within it. It also examines the research rationale and provides a contextual view of agriculture in the Maldives.

**Chapter two** provides a review of the literature relevant to the main research question and three supporting questions. In doing this, the literature informs the context of the research through an examination of the economic, environmental, and sociocultural considerations intersecting with agricultural activity in developing countries, small island developing states (SIDS), and the Maldives. Such considerations include a review of institutional agricultural policy and programming relating to: food security; producer and factor markets; agricultural finance; institutional capacity; land availability; land stewardship; climate change; agriculture health and nutrition; farming modalities; and, land rights and land tenure.

**Chapter three** discusses the methodology used in the research in collecting and analysing data. This chapter examines the philosophical perspective of the study, the use of a multisite case study with a phenomenological line of enquiry, data collection methods (interviews, discussions, field journal entries), data analysis and the use of coding, validity, bias, and ethics, and the orientation of the research.

**Chapters four** comprises the first of the three findings chapters (chapters 4, 5, and 6), and codes participant responses and my observations relating to the first supporting question:

*What do farmers in the Maldives understand by the terms 'sustainable agriculture', and 'building capacity in agriculture'*? This chapter establishes the participants' baseline understandings of the terms 'sustainable agriculture', and 'building capacity in agriculture', and sets the tone for the findings in chapters five and six. Two codes comprising nine subcodes are presented in this chapter.

**Chapter five** comprises the second findings chapter and codes participant responses and my observations relating to the second supporting question: *What are the key factors encountered by farmers in the Maldives?* This chapter explores the factors (circumstances, facts, and influences) that contribute to Maldivian agriculture. Seven codes comprising thirty subcodes are presented in this chapter.

**Chapter six** comprises the third findings chapter and codes participant responses and my observations relating to the third supporting question: *What measures do farmers in the Maldives believe will help build their agricultural capacity through sustainable means?* One code comprising four subcodes is presented in this chapter

**Chapter seven** comprises the discussion chapter where the ten codes to emerge in findings chapters four, five, and six, are reduced to six core codes. The six core codes are discussed in relation to the relevant literature and my experience of working in agriculture in the Maldives. The six core codes form the basis of a six-point farming framework and accompanying recommendations which answer the main research question.

**Chapter eight** comprises the conclusion chapter and presents conclusions of the research, reflections on the research journey, and future research opportunities.

## 1.5. Country profile of the Maldives

**Physiography**

The Republic of Maldives is located on latitude 3° 15' N and longitude 73° 00' E, and is 600 km south of India and 750 km south west of Sri Lanka (Ministry of Home Affairs Housing and Envrionment, 2001). This Indian Ocean archipelago comprises 1,192 coral islands formed into a double chain of twenty six natural atolls stretching 820 km north to south, and 130 km in width (Ghina, 2003). The atolls comprise of live coral reefs and sand cays, situated atop the 960 km long Chagos-Laccadive submarine ridge that rises from the Indian Ocean seabed (Global Islands Network, 2012). The reefs and cays have formed into small low lying

islands over thousands of years, with none exceeding two metres above mean sea level (Ghina, 2003). It is upon these islands that agriculture in the Maldives takes place.

**Figure 3. Aerial view of part of Baa Atoll.**



*Source: http://www.beach-on-map.com/kendhoo.html*

Land in the Maldives accounts for 300km$^2$ of the 90,000m$^2$ national territory (FAO, 2011a). The landmass is occupied by 197 inhabited islands comprising local population and the majority of cultivated farmland. A further 105 resort islands, thirty four industrial islands (UNDP, 2014), and fifty-six commercial agricultural islands occupy the remaining landmass. Most of the islands have an area of 1 km$^2$, with thirty three islands occupying areas larger than 1 km$^2$, and three islands occupying areas larger than 3 km$^2$ (Ghina, 2003; Naseer & Hatcher, 2004). The largest island of Gan in Laamu is approximately 5.2 km$^2$ (Ghina, 2003). FAO (2011) noted that 7,000 ha. is recorded as cultivated area in the Maldives, of which 4,000 ha. is arable and grassland, and 3,000 ha. are permanent crops such as coconut and areca nut.

**Figure 4. Aerial view of Male' the capital island, and Vattaru agricultural island.**



*Source: ethicsandinternationalaffairs.org*



*Source: Paul Van Driessche*

**Political economy**

The Maldives is framed within the context of many small island developing states (SIDS) where its smallness and isolation result in a low population density, narrow economic range, aid dependency, and vulnerability to internal and external shocks such as severe weather and price spikes affecting factor and producer markets (UN Press Room, 2013). Despite these constraints, the Maldives has generated impressive economic growth, firstly in the seventies with the mechanisation of fishing fleets geared towards the export of tuna products, and then in the eighties with the development of luxury tourism (Colton, 1995). Illustrating their continued contribution to economic growth, the latest 2016 gross domestic product (GDP) contributions for fishing and tourism are recorded at 3.6% and 22.7% respectively (National Bureau of Statistics, 2017). Meanwhile, agriculture continues to contribute a smaller GDP contribution which in 2016 was 1.3% (ibid). Despite the wealth generated by fishing, the main benefactors remain the government and a small group of businessmen who own commercial fishing fleets and canning factories. In the case of tourism, a small cabal of tourism tycoons continue to reap much of the benefit.

In realising the economic potential of both fishing and tourism, the Maldivians' inherent ability to trade is of significance. As noted by the colonial cartographer Bell (1883) [1], the Maldives had a great propensity for trade with vessels traversing the major oceanic trade routes between Africa, the Middle East, and Asia. Such trades involved local goods such as cowrie shells, coir rope, and coconut being exchanged for virtually all other required goods including the food staples of rice and maize (ibid). In the case of today's trade in fish, exports are sold in south east Asia, and with tourism, holidays are sold to affluent western, and latterly Russian and Chinese markets (World Bank, 2013).

Development of the Maldivian economic landscape was firmly vested in an authoritarian polity with a president at its apex (Colton, 1995). Over the last thirty years the polity was dominated by the Gayoom family, but between 2008 to 2012, this was interrupted with the installation of a president that was widely acknowledged to be the first that was democratically elected in the Maldives (Freedom House, 2011). Today, the Maldives

[1] H.C.P. (Harry Charles Purvis) Bell (1851–1937) was a British civil servant in the Ceylon Civil Service who investigated the archaeology and epigraphy of the Maldives. Bell's reports were widely acknowledged as an authoritative guide to the history of the Maldives. His reports included references from: Ibn Battuta 1343-44; Francois Pyrard de Laval 1602-07; and the government surveyors of the Indian navy – Captain Moresby and Lieutenants Christopher, Powell and Young 1834-36 (Bell, 1883).

continues under a reversion to the past familial Gayoom authority, with accompanying political instability, poor fiscal outlook, and increasing social and economic inequity in terms of opportunity and income (World Bank, 2017). Comment by the World Bank on the Maldives in 2013 and 2017 noted:

> In the early 1980s, the Maldives was one of the world's twenty poorest countries, with a population of 156,000. In 2012, with a population of more than 300,000, it is a middle-income country with a per capita income of over U$6,300. The country has impressive improvements in health and education with a life expectancy of 74.8 and a literacy rate 98.4%. However, the country faces challenges in environmental sustainability, policy uncertainty and service delivery (World Bank, 2013 p.13)
>
> It [the Maldives] has a complex political situation, weak government institutions, a high fiscal deficit, and inclusion issues (World Bank, 2017, p.1)

## 1.6. The agricultural context of the Maldives

**Introduction.**

Despite the traditional prominence of fishing in Maldivian life as noted by Maloney (1980): "The economy is based on fishing, to which the whole system is attuned" (p.1), agriculture had provided valuable sustenance to remote island communities before the proliferation of food imports and improved transport connectivity (ADB, 2005). However, unlike fishing which had mechanised its fleets in the seventies, and tourism which had captured high end markets in the eighties (World Bank, 2013), agriculture remained a largely subsistence and semi subsistence activity conducted in home gardens and small field plots (IFAD, 2006). Illustrating this point, figures from the Maldivian National Bureau of Statistics noted that the agricultural sectors' contribution to Gross Domestic Product (GDP) fell from a high of 7% in 1984 to 2% in 2006 where it remained until more recent declines to 1.3% in 2017 (National Bureau of Statistics, 2017). Direct employment in agriculture was further noted as hardly changing between the census of 2006 (4,209 people) and the census of 2010 (4,121 people) (DNP, 2012). Despite this, IFAD (2006) estimated that agriculture was still undertaken by an estimated two thirds of the population, contributing up to ten percent of the national food requirement in the form of fruit, legumes, starch tubas, salad leaves, herbs and spices.

Set against a stagnating agricultural backdrop mainly defined by low productive capacity, the increasing domestic and tourist population relied more and more upon food imports. In 2009 the World Trade Organisation estimated that 90% of the Maldives food requirement was imported (WTO, 2009). FAO added that the high percentage of food imports into the Maldives was unlikely to change in the near future (FAO, 2012a).

Low productive output in small island developing states (SIDS) that were characterised by smallness and isolation was not uncommon according to Briguglio (1995). FAO (2004), and Poonyth and Ford (2005) noted that SIDS agricultural output was typically confined by a narrow economic range characterised by poor market connectivity to factor[2] and producer markets, limited employment of innovation in farming practices, and a poor technical capacity within labour functions. However, in their article on sustainable agricultural intensification in Tongatapu, Van de Velde et al (2006) highlighted the opportunity for monoculture crops for export markets as a way of expanding low domestic productive output. As IFAD (2013) noted, in the case of the Maldives, the development of export opportunities for high value niche crops had been an integral part of their flagship FADiP programme assistance to MoFA. However, this had failed for a variety of reasons including unrealistic assumptions regarding capacity building of production and processing output, and marketing connectivity (IFAD, 2013).

In providing a snapshot of the Maldivian agricultural context, I next move to discuss salient factors which I believe present themselves for consideration in this research.

**Terminology and classification used in the research**

The words 'agriculture' and 'farming' were used interchangeably throughout this thesis reflecting how the participants referred to particular topics. Both the words 'agriculture' and 'farming' refer to the cultivation of fruit, legumes, starch tubas, salad leaves, herbs and spices unless specified. This produce includes: watermelon; cassava, taro, brinjal, young coconut; coconut; papaya; pumpkin; sweet potatoes; cucumber; banana; gourds (wax/bottle/snake); butternut; Chinese cabbage; yam; drumsticks; luffa[3]; betel leaf; chilli; and, mango (DNP, 2011). Reference to agriculture and farming also refers to small pockets of livestock production which include backyard poultry and goats, and a larger egg commercial egg producing unit.

Fishing was not included in the main body of this research due to its perceived lack of fit within the research parameters. For example, unlike agriculture, fisheries were dominated by commercial and institutional investment geared towards high-tech product processing for export markets. However, reference to fishing activity was made in comparison to agriculture in terms of employment and income generation.

[2] Factor markets include markets for farming inputs such as seed, fertilisers, machinery and equipment.

[3] Belonging to the cucumber family. Not dissimilar in appearance but with more defined grooved sides.

The classification of islands in this thesis was twofold. Firstly, there was reference to commercial agricultural islands that were typically without settlement and infrastructure, and which were allocated for agricultural leasehold where specific terms and conditions relating to agricultural activity and land tenure were recorded within a lease (MoFA, 2010). Secondly, there were inhabited islands which had settlements and infrastructure, and where agriculture was conducted in household gardens, or in small field plots allocated by the Island Council (MoFA, 2010; ADB, 2005). No security of agricultural land tenure existed on the inhabited islands with the Island Council able to take back field plots at their discretion (ADB, 2005). During my work in the Maldivian agricultural sector, I observed that an island could be referred to as either a 'good fishing island' or a 'good farming island' depending upon the islands' historical or current fishing and agricultural proficiency. I further noted that the majority of agriculture in the Maldives was conducted on inhabited islands.

The Agricultural Development Master Plan 2010-2025 of 2010 highlighted nineteen significant inhabited islands in the Maldives where established agricultural production and market linkages existed (MoFA, 2010). These were: Baarah (Haa Alifu)[4]; Kelaa (Haa Alifu); Feevah (Shaviyani); Landhdoo (Noonu); Kedhikulhudhoo (Noonu); Goidhoo (Baa); Kaashidhoo (Male'); Thoddoo (Alif Alifu); Gan (Laamu): Fondadhoo (Laamu); Kunahandhoo (Laamu); Hitadhoo (Laamu); Vaadhoo (Gaafu Dhalu); Gadhdhoo (Gaafu Dhalu); Foahmulah (Gnaviyani); Meedhoo (Seenu); Hitadhooo (Seenu); Veymandhoo (Thaa); Magoodhoo (Faafu).

**The nature of agricultural production and marketing.**

The stagnation of the agricultural sector in terms of its persistently low contribution to GDP belied the vital role it played in supporting large numbers of the population both in food and rural incomes (ADB, 2005; MoFA, 2010). Subsistence agriculture as practiced by two thirds of the population was typically undertaken in household gardens and small field plots on inhabited islands where families, or individuals [usually women], cultivated and harvested traditional field crops (IFAD, 2006). Men would typically undertake heavy lifting and negotiation with factor and producer markets for the purchase of farming inputs and the sale of produce (ibid). Men were also farm managers of larger semi-subsistence and commercial farms (IFAD, 2006).

[4] () Denotes the local atoll name.

Commenting on the presence of women in agriculture IFAD (2017) noted:

> How many women are directly involved in agriculture is unclear. A United Nations Development Programme report quoted in the programme appraisal document claims that 85 per cent of farmers in Maldives are women, while the 1995 census data indicate a figure of 11 per cent. The same figure of 11 per cent is given in the 2014 census (IFAD, 2017, p. 27)

In IFADs programme performance evaluation of its own Post Tsunami Agriculture and Fisheries Rehabilitation Programme, they noted that little emphasis was placed on mainstreaming gender issues in agriculture where: "Access to resources and assets, distribution of women's workload and women's influence in decision-making" (p. vii) were poorly dealt with, if at all (IFAD, 2017). This inaction weakened the hand of Maldivian women farmers' efforts in attempting to build their agricultural capacity.

Maldivian farming was typically located on inhabited islands either in small field plots on the edges of settlements or in household gardens (MoFA, 2010). Plot sizes for household gardens ranged from 100-200m$^2$, and for field plots between 100-1000m$^2$ (ibid). Cultivation methods included bush fallow and settled type year-round cultivation utilising low farming technology farming. The produce from subsistence farming was used for home consumption and sold at the farm gate to neighbours and island shops (ibid).

**Figure 5. Household garden with potted chili plants and fruit trees providing produce and shade.**



*Source: Paul Van Driessche*

From my personal experience I observed that semi-subsistence agriculture was undertaken in much the same way as subsistence agriculture, but with the use of small scale technology in the form of greenhouses with hydroponic systems. This was typically used for the cultivation of niche crops such as melons and salad crops including lettuce and tomatoes. IFAD (2013) noted that crops from semi subsistence agriculture were more likely be supplied to larger customers on a semi regular basis, although the presence of formalised supply agreements were unlikely due to the inability of local farmers to supply customers continuously. Hence the preference by customers, such as neighbouring resorts and food trader's trading in the main Male' fruit and vegetable market, for imported food flows (ibid).

By virtue of its generally larger operation, semi-subsistence agriculture would be more likely to have improved access to farming inputs and land and would employ migrant agricultural labour (ADB, 2005). In all aspects of Maldivian farming, migrant agricultural labour, usually from Bangladesh, was drawn upon for its labouring prowess, its rudimentary agricultural knowledge (FAO, 2012a), and in my observation, its considerable entrepreneurial capacity.

**Figure 6. Cabbage cultivation on a field plot utilising mechanically pumped groundwater.**



*Source: Paul Van Driessche*

**Figure 7. The hydroponic cultivation of lettuce under shade cloth.**



*Source: Paul Van Driessche*

Commercial agriculture sometimes resided on those few larger inhabited islands where there was sufficient arable land with relatively fertile soil and adequate water reserves (ADB, 2005). However, such characteristics did not guarantee agricultural activity particularly if the island was a significant distance from the main Male' market with transportation either too infrequent or expensive to deliver produce (ibid).

More commonly, commercial agriculture was undertaken on commercial agricultural islands under an agricultural leasehold where a company or individual would have sufficient investment to facilitate infrastructural development, technical expertise, labour, and ease of access to producer and factor markets (FAO, 2012a; IFAD, 2017). Agricultural leaseholds typically involved leasing an entire island for a minimum period of usually twenty-one years (MoFA, 2010). Despite fifty-six islands being under commercial agricultural leasehold in 2017, it is unclear how many are functioning agricultural units (IFAD, 2017).

**Figure 8. Commercial hydroponic cultivation in greenhouses producing fruit and salad varieties.**



*Source: http://www.hortifarm.com.mv/index.html*

**Understanding the terms 'sustainable agriculture' and 'building capacity in agriculture'.**

I commence this section with reference to my own understanding of the terms 'sustainable agriculture' and 'building capacity in agriculture'. I believe 'sustainable agriculture' is where the greatest confluence of economic wellbeing, environmental conservation and social equity resides in agricultural activity. In terms of my understanding of 'building capacity in agriculture', I believe this relates to context specific factors that enable sustainable agriculture to exist. Such factors include: knowledge transfer; profitability; access to producer and factor markets; labour availability; investment funding, and so forth. My experience of working in the Maldivian agricultural sector has informed me that many farmers believe building productive capacity through such means as investment, technology, and access to markets will lead to profitable farming. Therefore, the generation of profit or financial sustainability leads to 'sustainable agriculture'.

In examining the historical perspective of sustainable agricultural capacity, Bell (1883), Butany (1974), Husain (1976), and Maloney (1980), suggested that sustainable agriculture existed in the Maldives from ancient times providing sustenance and incomes for its people. Indeed, Ibn Battuta, the 14$^{th}$ century chronicler and traveller, noted in Husain (1976) that the Maldives had the ability to sustain itself in food production with an abundance of coconuts providing milk, oil, honey, and confectionary; he further alluded to the ready availability of fresh and dried fish delicacies. De Laval, Moresby, and Young, added in Bell (1883) that Maldivian agriculture produced a variety of fruits, vegetables, millets, and fish, however, they noted that this diet was generally deficient of nutritional content. In supplementing the Maldivian diet, Bell (1883) noted that some produce was sourced from southern India especially rice which was used by Maldivians on a daily basis. Historically,

there was evidence that Maldivian agriculture had the capacity to sustain its small population in the provision of food.

As demand for food variety, quality and quantity increased, local food stocks were supplemented with increasing quantities of food imports from neighbouring countries and further afield (MoFA, 2010). This trend gradually tipped the balance from the Maldives being a net food producer to being a net food importer; Maldivian food security became predicated on the capacity to purchase food imports rather than the capacity to grow food locally.

**Figure 9. A school pupil's view of agricultural development over the last fifty years.**




*Source: Khadheeja Shua Abdulla (13), Jamaaludheen School, Male'.*

**How agriculture fits into island life.**

Ashoff and Streeten in Armstrong et al. (1998) posited that the smallness of SIDS encouraged "greater social homogeneity and cohesion" (p. 641). Srebrnik (2004) added that smallness and remoteness engendered community unification as people realized it was easier to get along with each other than to maintain confrontational relationships. Lowenthal (1987) described this communality as a "managed intimacy" (p.39) where negative feelings were often masked for the sake of social harmony. From my personal experience it was Lowenthal's' reference to a 'managed intimacy' that bore most relevance

to island farming in the Maldives as I observed that farmers realised they had to get along with each other but preferred not to exist in a close state of intimacy. I observed that this involved sharing common island resources such as transportation and water, but not sharing in monetary and labour agreements. Recently, IFAD (2017) reaffirmed the reluctance of communities to engage in collectivised activity involving financial arrangements when it noted: “It was pointed out that communities were extremely wary about the possibility of cooperatives being used as rural financial intermediaries” (p.15).

In delving further into sociocultural considerations that intersected with island farming communities in the Maldives, the Spanish writer and scholar Xavier Romero-Frias (1999) described the communality on Maldivian islands as an “idea of wholeness” (p.62), where factors such as love, jealousy, and disease, were inseparable from the islands main activities of fishing, farming, and trading. He posited that this led to feelings of self-containment, but not always contentment, as internal occurrences that were associated with anything out of the ordinary could cause resentment and jealousy. MoFA (2010) had in part validated this position when it posited that jealousy in farming was often predicated on internal occurrences such as outstanding crop yields. MoFA further noted that jealousy could result in malevolent plotting against another farmer manifesting itself as malicious gossip or the vandalism of crops. Romero-Frias (1999) posited that due to the potential disruption from internal occurrences, true friendships were a rare commodity on small Maldivian islands. In my experience of living and working on Maldivian islands I would attest to this.

Despite the aversion to formalised congregative farming practice, Maloney (1980) noted that Ellis had alluded to friends coming together to help each other particularly in times of stress. Ellis had referred to this as the embrace of “cooperative principles” (p.180). FAO (2012a) had noted that such cooperative action comprising informal groupings of friends could form together to assist in more general farming tasks such as land clearing and weeding. Clearly this cooperative action serves as an example that the building of agricultural labour capacity within an accepted sociocultural island construct can occur within the Maldivian context.

**Cooperatives**

The preference for individualistic farming as noted by IFAD (2017) appeared at odds with the prescribed collectivism of cooperatives advocated by the two major MoFA/IFAD interventions in Maldivian agriculture. These were in 2009 with the Post Tsunami Agricultural and Fisheries Rehabilitation Programme (PTAFRP) that was designed to

establish community based producer organisations (CBPOs) to assist tsunami affected farmers recover their productive output in order to better connect with markets (IFAD, 2006). Implementation delays resulted in this project's revitalisation in 2008/9 where the impetus on tsunami recovery was replaced by an impetus on building productive capacity. Following on in 2011, the second major agricultural intervention was the Fisheries and Agricultural Diversification Programme (FADiP) designed to promote agricultural value chains through cooperative vehicles utilising shared technology, new knowledge, technical expertise, and farming inputs (IFAD, 2008). This was undertaken with a view to improving market connectivity (IFAD, 2008).

IFAD (2013; 2017) noted the inherent weaknesses of both intervention designs which were largely based upon incorrect assumptions; they contended that this led to the disappointing intervention outcomes. In commenting on such outcomes regarding the establishment of agricultural CBPOs in the PTAFRP intervention, IFAD (2017) noted: "By 2013 only 10 CBPOs had been formed against a target of 150. Only 5 were working "properly", but these were dependent on FADiP support" (p.18). It was then curious that IFAD who had acknowledged the preference for individualistic farming activity, continued to support the development of collectivised agricultural structures in the form of CBPOs and cooperatives since these appeared to be at variance with the fundamental sociocultural tenet residing within island communities which favoured individualistic farming activity. Of further curiosity is how MoFA/IFAD expected such participant reticence over cooperative structures to advance either the building of agricultural capacity, or indeed, sustainable agriculture when participation in cooperative activity was noted by IFAD (2017) to be dwindling due to their poor performance.

**Figure 10. FADiP funded greenhouses for an island cooperative.**




*Source: Paul Van Driessche*

**Profitable agriculture.**

My experience of working with Maldivian farmers has led me to believe that profitability is one of the key motivations for engaging in agricultural activity. Simply put, without profitability there was little point in farming.

Levels of profitability, or indeed loss, were not easily identified in Maldivian farming operations according to ADB (2005) and MoFA (2010) who noted that recordkeeping by farmers, particularly in financial matters, tended to demonstrate more of a general trend than evidence-based fact. Problems with recordkeeping were further alluded to by IFAD (2013) regarding the introduction of new accounting software where cooperative staff were confused in its operation, and simply reverted to the previous ad hoc data entry into journals: “The software is too sophisticated for the cooperatives thus they prefer to maintain manual records or use MS Excel to maintain simple records” (IFAD, 2013, p. 4).

MoFA (2010) noted that the financial status of most agricultural activity in the Maldives was perceived as marginal, with the financial status of the fledgling commercial agricultural sector being largely unknown. IFAD (2013) confirmed this observation when they noted that in terms of the FADiP cooperatives, there had been little progress in generating profits.

Entwined within the reference to profitability, was the belief that ‘clean’ technology in the form of greenhouses and hydroponic feeding systems had a higher chance of being profitable than conventional field farming. In this instance, ‘clean’ referred to neatness and orderly layout rather than lower carbon emissions. This belief appeared rooted in a sociocultural consideration where islanders attached considerable significance to visible impact; this extended to the way they dressed and the way in which farms were presented. Illustrating this point, schoolteachers I had known noted that their students would be attracted to technology-based farming in greenhouses that were clean, neat, tidy and profitable.

**Market connectivity.**

The IFAD *Rural Poverty Report 2011* had noted that many smallholders in the developing world regarded connection with producer markets as the vehicle through which their farming effort was translated into financial gain (IFAD, 2010). IAASTD (2009) and Conway (2012) added that disconnection from producer markets could not only result in financial loss, but also feelings of exclusion and insularity where farmers could become so disillusioned with agriculture, they exited the sector altogether.

In the Maldives, Butany (1974) had referred to market connectivity in his *Agricultural Survey and Crop Production* publication where he commented on difficulties encountered by farmers in physically connecting with the Male' market due to long sailing times from production islands. Maloney in his 1980 book, *People of the Maldive Islands,* echoed this difficulty when he noted: "Of great significance is the absence of any marketing system for produce…" (p. 289). In remedying this situation, Maloney suggested that the Government of Maldives (GoM) and its donor partners develop a national marketing system.

Market connectivity was impacted by the spatial dimension of the Maldives comprising small islands scattered over a large area, which made transportation between them expensive, time consuming, and often erratic due to infrequent transportation services (ADB, 2005). Market connectivity was further hindered by poor communication skills where the pre-ordering of inputs, and produce sales to customers could be disrupted due to a lack of communication between suppliers and customers (IFAD, 2008). IFAD (2013) noted that this was a particular problem with CBPOs and cooperatives who sometimes failed to either order sufficient pesticides and seeds for its cooperative member farmers, or failed to notify resort customers regarding either delivery shortages or changing delivery schedules. Poor product quantity, variety, pricing, quality, packaging, and continuity of supply all featured as concerns amongst MoFA and it donor partners in attempting to link local production to the tourist food market (FAO, 2012a). Such production and market slippages on the part of farmers, cooperatives and CBPOs, disincentivised customer patronage of local production, and appeared to strengthen customer ties with food importers (IFAD, 2017). This hardly boded well for institutional capacity building efforts towards sustainable agriculture.

**The Male' fruit and vegetable market.** The Male' fruit and vegetable market acted as the country's main trading hub for locally produced and imported fruit, vegetables, salad varieties, and spices (FAO 2012a). Smaller markets in regional centres such as Kulhudhufushi Island (Haa Dhaalu Atoll) in the north, and Hithadhoo Island (Seenu Atoll) in the south, also traded local and imported food in neighbouring islands/atolls (DNP, 2011). MoFA (2010) noted that the produce traded through the Male' market was mainly sold to the local population, and to a lesser extent, the tourist sector, whereas, commercial food distributors mainly supplied the tourist sector with food they had directly imported. ADB (2005) and MoFA (2010) also noted that local produce was sold through farm gate sales on the production islands, particularly where quantities were small, and where the islands were relatively isolated from main ferry routes.

On those islands where transport connectivity was adequate, sale transactions on producer islands typically involved farmers selling produce to visiting food traders whom comprised businessmen and women, and visiting boat crews (MoFA, 2010). From my experience of working on the islands, the food traders usually paid the farmer when taking possession of the produce or agreed to remit an agreed selling price to the farmer once the trader had sold the produce in Male'. On some occasions, farmers did not fix a selling price but instead trusted the traders to get the best price for the produce in the market.

MoFA (2010) noted that the fledgling commercial agricultural sector supplied high value niche products such as salad varieties and speciality fruits either directly to resorts, or to retail outlets in Male'. In a few instances the resorts produced some of their own food requirement such as salad varieties, fruit, and vegetables for guest and staff consumption (ibid).

**Figure 11. Transporting produce from the islands to the Male' market**




*Source: Paul Van Driessche*

**Imported food market.** India, the United Arab Emirates, Sri Lanka, and Singapore were the main suppliers of food to the Maldives (Maldives Customs Services, 2017), with their supply chains characterised by reliable delivery schedules, competitive pricing, quality uniformity,

and food safety. Once food product arrived in the Maldives, the efficiency of this supply chain continued with the efficient product distribution to customers through local food distributors (ADB, 2005). MoFA (2010) noted that while local production could intermittently provide a comparable quality and price to imported food, it could not compete with quality consistency and continuity of supply. This, they contended, deterred commercial food distributors from sourcing locally produced food as their customers, particularly in the tourist sector, were reliant upon regular deliveries of high quality produce at competitive pricing (MoFA, 2010).

My experience of working in the agricultural sector had indicated that the abundance of imported food into the Maldives gave cause for some complaint by participant farmers concerning unfair competition. The complaint focussed on the cheaper production costs in countries supplying the Maldives, such as in India, Sri Lanka, and Thailand, where farming inputs and labour were known to be less expensive than inputs and labour in the Maldives. Further complaint over unfair competition centred on the activities of local food traders' who were able to able to react quickly to produce shortages and surpluses in the Male' market by either importing food or dumping surpluses at discounted pricing. This caused price volatility which could result in either deflated prices for farmers produce or their produce remaining unsold.

In reducing the flow of imported food into the Maldives, MoFA noted that there had been a call from some farmers for the introduction of import tariffs and quotas. It was further contended that this would act as a stimulus to local production MoFA (2010). However, it was unlikely that the donors would support measures that distorted the market to an extent where consumers may have to pay higher prices due to insufficient local productive capacity in filling imported food gaps (IFAD, 2013).

**Agro dealer markets.** Integral to building productive capacity was access to factor markets supplying farming inputs such as seed, fertilisers and equipment. Such access was noted as being intermittent and expensive mainly due to transportation both from an outside country to the Maldives, and then transportation from the Male' hub to the islands (Butany, 1974; ADB, 2005; MoFA 2010). FAO (2012a) contended that this situation had eased in recent years as more businessmen located in the capital of Male' had recognised the business opportunity of input supply to farmers in the islands. In pursuing this opportunity, the businessmen had established retail shops in Male' and agencies on the islands (ibid).

Despite this, FAO (2012a) noted that continued complaints of intermittent supply and expensive products still persisted.

MoFA (2010) also noted that although many agro dealers attempted to assist farmers with technical advice on product handling and usage, their advice was: “Inadequate given the limited technical expertise of their staff…” (p.16). This could lead to the misuse of chemical products resulting in crop damage or threats to human health.

**Figure 12. Agro dealership in Male’.**




*Source: Paul Van Driessche*

**Transportation.** In response to connecting the large spatial disbursement of people in the Maldives, most national development plans included improved transportation networks comprising increased frequency of service and increased passenger/cargo carrying capacity (GoM, 2009; Ministry of Planning and National Development, 2007). Despite this planning, a lack of inter-island and inter atoll transportation connecting farmers to the markets was acknowledged by MoFA (ADB, 2005, MOFA, 2010), and reiterated by FAO in 2012: “There is

also a clear shortfall in the infrastructure critically needed for agriculture development such as transport, harbours, and jetties" (p. 11).

Transportation connecting farmers to markets was noted to vary depending on an island's proximity to the Male' market, or to regional transportation hubs; those islands within close proximity to Male' or the regional hubs enjoyed a higher frequency of service to Male' than those islands located further away (FAO, 2012). It is unknown to what extent an increased frequency and coverage of national transportation would build agricultural capacity. However, IFAD (2017) noted that improved access to infrastructure in areas such as power, transportation, and freshwater was integral to strengthening farmers' ties to the market.

**Figure 13. A large cargo dhoni discharging its consignment of papaya in Male'.**




*Source: Paul Van Driessche.*

**Stigmatisation of farming.**

Early commentators on Maldivian agriculture such as Bell (1883) noted its parity with fishing in terms of the contribution it made to the survival of island communities. Butany (1974) added: "Maldivians are agriculturists by inclination and fishermen by compulsion" (p.6), as fishing was easier and generated almost immediate financial returns: "Agriculture, however, takes precedence over fishing in certain islands where crop cultivation is more profitable" (p.7). With the onset of fishing mechanisation in the later seventies, the perception of

sociocultural and economic parity between fishing and agriculture began to change, particularly in view of the lucrative export markets developed for local tuna products (IFAD, 2006). However, agriculture remained a largely subsistence activity serving immediate island communities and trading through Maldivian market hubs (ibid).

With the rapid development of luxury tourism in the eighties and the accompanying demand for high end food products, resort customers turned to imported food flows as local production capacity was unable to supply what the tourist market required (IFAD, 2008). The easy accessibility and considerable variety of imported food simultaneously appealed to Maldivian consumers resulting in a gradual demise in the significance of local production to sustain island communities (ADB, 2005).

While the introduction of luxury tourism may have presented an opportunity to build sustainable agricultural practices to serve an expanding domestic and tourist demand, a change was witnessed as the perception of agriculture began to shift from one that embodied the provision of food for island survival, to an activity undertaken more as a pastime by the aged and unemployed, and by migrant agricultural labour. Indeed, the capacity building of Maldivian agricultural practices continued to suffer when Maloney (1980), made distinct references to the exiguity and unrespectability of agriculture: "Farming is not usually a full-time occupation, nor is it as respectable as fishing" (p. 287). He further observed that farming could be done by anyone, more commonly women, and was usually a stopgap during times of lean fishing or undertaken by those who were not good at fishing. In continuing to observe the primacy of fishing in Maldivian culture, Maloney (1980) argued: "The economy is based on fishing, to which the whole system is attuned" (p. 1), and, "Fish is the most important product of the Maldives, and fishing is what Divehi's [Maldivians] do best" (p.25). Clearly from Maloney's commentary, agriculture was stigmatised as less respectable than fishing, and by proxy, so too where efforts towards agricultural capacity building.

The GoM in its *7th National Development Plan 2006 -2010* (Ministry of Planning and National Development, 2007), *The Strategic Action Plan 2009-2013* (GoM, 2009), and the *Agricultural Development Master Plan 2010 - 2025* (MoFA, 2010) acknowledged that agriculture had played a secondary role to fishing for employment opportunity since the late seventies. Indeed, in an effort to counter the diminishing perception of agricultural practices, *The Strategic Action Plan 2009-2013*, explicitly articulated the view that the perception of

traditional farming as a low-class activity had to be de-stigmatised in order to encourage investment and youth participation in its future development (GoM, 2009).

It is unclear what is at the core of agriculture's stigmatisation to Maldivians; whether it be community perceptions that agriculture is only undertaken by lowly paid migrant workers, or whether the lack of teaching in schools resulted in a failure to reveal agriculture's potential as a profitable business opportunity. What is clear however, is that agriculture's stigmatisation undermined efforts at building Maldivian agricultural capacity in a sustainable way most noticeably reflected in the absence of youth participation in its activity.

**Agricultural knowledge gaps.**

This section examines the gaps in agricultural knowledge which diminish capacity building opportunities and contribute to agricultural unsustainability.

**Chemical pesticide and fertiliser usage.** Concern over the lack of knowledge surrounding the correct use of chemical pesticides and synthetic fertilisers centred on the potential harming effects to human health from food containing chemical residue, and on environmental degradation through chemical residue polluting water and soil resources (Ministry of Environment and Energy, 2015). MoFA (2010) and FAO (2012a) noted that many farmers were not fully aware of the correct application, dosage, handling, and storage procedures for the pesticides and fertilisers they used on their farms. They continued that a further concern was the unwitting use of banned chemicals by farmers, where foreign language labelling could mask the identification of banned substances to both the enforcement agencies at the point of entry into the country, and to the farmers themselves (ibid). Illustrating this concern, MoFA noted: "The government in any case lacks the capacity to regulate importation and handling of hazardous chemicals even though it has a general policy to discourage unscrupulous use of agrochemicals and chemical fertilizers to prevent groundwater pollution" (MoFA, 2010, p.16).

In the case of synthetic fertilisers, its overuse did not appear to trigger the same level of concern possibly because the effects were viewed as being less immediate. However, FAO (2012a) did voice their concern over the long-term polluting effects of nitrogen rich fertilisers on soil and water resources, particularly in view of the visible algal growth on reefs and in reef waters.

Organic heat-treated fertiliser imported into the Maldives attracted little concern as it was viewed as environmentally stable. However, MoFA (2010) noted some concern over the large quantities of untreated cattle dung imported into the Maldives acting as a vector in transmitting harmful pathogens and invasive species. Despite advising farmers of the heightened bio security risks this manure posed, its low cost and ready availability made it an attractive fertiliser option for many farmers (ibid).

**Youth participation in agriculture.** Previous reference has been made to the inclusion of agriculture as a dedicated school subject as a way of encouraging youth participation in agriculture. However, MoFA (2010) noted that the general stigmatisation of agriculture as low-class activity had negatively affected youth participation in agriculture to such an extent, that questions now existed as to the continuing presence of Maldivian farmers in island communities. This concern was raised against the backdrop of the increasing dominance of migrant workers in the agricultural sector (FAO, 2012a). IFAD (2006, 2008) noted the inclusion of youth in their classification of vulnerable groupings, however, they noted that participation rates still remain low with little evidence to support the required mind shift in youth thinking towards farming as a viable and acceptable occupation.

**Targeted knowledge.** Based on my experience of working in the agricultural sector, farmers often noted that more targeted agricultural knowledge was required based upon specific challenges they were encountering. Most noticeably this was to deal with pest intrusion damaging crops (MoFA, 2010). Despite the farmers' requests, IFAD (2017) commented on the limited capacity of the two agricultural research centres in assisting farmers added to the limited national coverage and technical capacity of the MoFA extension services.

**Impacts of climate change.** My experience in the agricultural sector led me to believe that whilst many farmers were aware that weather patterns governing their traditional planting and harvesting had changed over the last ten years, they were unaware that this could be linked to climate change. Further, it appeared that farmers' lacked understanding of the relationship linking agricultural pollution as one of the main contributors to climate change. This was unsurprising as IFAD noted that the two largest agricultural interventions to take place in the Maldives (PTAFRP, FADiP) paid scant regard to the inclusion of climate change in the programmes. Of PTAFRP, IFAD noted:

> In this programme, no consideration was taken of the possible effects of climate change and sea level changes on Maldives. For example, the 2013 supervision mission report indicated that programme design did not provide for any specific activities aimed at addressing either climate change resilience through adaptation, or climate change mitigation. If the original

> objective of reducing people's vulnerability to natural disasters had been maintained, issues concerning climate change could have been addressed (IFAD, 2017, p.28-29)

It appeared evident that the lack of agricultural knowledge relating to agricultural pollution and its links to climate change is one of the many factors that hindered capacity building amongst farmers and contributed to the environmental unsustainability.

**Institutional capacity deficits.**

MoFA was noted as the key provider of agricultural assistance to the majority of farmers in the Maldives (FAO, 2012a; IFAD, 2006, 2008), therefore, its main capacity deficit in providing technical agricultural knowledge to a wide coverage of farmers diminished the farmers' capacity building opportunities. MoFA's capacity deficits were largely underpinned by budgetary shortfalls which impacted heavily on the recruitment of appropriately trained staff (MoFA, 2010). As noted in its own critique, the *Agricultural Development Master Plan Maldives 2010 – 2025* explained: "The present employed staffs are neither sufficient in number nor capable in undertaking their mandated duties and functions" (MoFA, 2010, p. 12).

Wider observation of MoFA's capacity deficits was referenced in donor documentation, as were the plans to address this this shortfall (MoFA, 2012a). IFAD (2017) noted that attempts to build MoFA's technical capacity focussed on policy support, training facilitators who would assist programmes in the field, and offering MoFA staff diploma and, in some instances, degree opportunities. In the case of the facilitators, IFAD noted:

> The assumption that suitable people would be available for training and deployment as "facilitators" … proved wrong. Those recruited by the programme were mainly school leavers with little experience in or knowledge of agriculture, or of what their role might be (43.3 per cent were 20 years old or under). Facilitators were employed on a part-time basis and were paid between MVR 1,250 and MVR 3,000 per annum (US$83 to US$200) by the programme. Some facilitators indicated to the team that they had little incentive to conduct training sessions as they were neither paid nor supported by local authorities (IFAD, 2017, p. 15).

But all was not gloom as IFAD (2017) continued to note that institutional capacity building components directed towards MoFA staff had reaped some positive results in farmer training especially in areas of pest control, the use of composting, and organic fertilisers.

Further note was made by MoFA and IFAD of the budgetary constraints that impacted on both of the MoFA agricultural research centres located on the islands of Gan, and Hanimaadhoo. It was noted that their mandates for conducting training, and adaptive and applied research trials, were inadequately fulfilled (MoFA, 2010, IFAD 2006).

**Regulation.** FAO (2012, 2012a) noted that despite the drafting of legislation and regulation in areas such as hazardous pesticide usage, and plant protection, enforcement of such directives remained inconsistent largely because the enforcement authorities often lacked the qualified manpower.

**Farming technology and infrastructure.** The employment of technology in agriculture was noted to be present in this research as farmers irrigated field plots, used solar panels to provide power, and utilised controlled environment cultivation with greenhouses and hydroponic systems (UNDP, 2013; MoFA, 2010). However, my experience noted that the provision of greenhouses with hydroponic systems provided by MoFA to cooperatives did not enjoy the same success, with most systems either dysfunctional and/or in considerable states of disrepair. It is unknown whether the reasons behind this are to do with mismanagement, severe weather occurrences, or other factors. Conversely, my experience of greenhouses operated by individual farmers was more positive as most were fully operational and well maintained.

**Figure 14. Differing views of greenhouses.**

A cooperative greenhouse in an advanced state of disrepair, and a fully operational individual farmers greenhouse.



*Source: Paul Van Driessche.*

**Incentives to invest in agriculture.** IFAD (2017) noted that institutional capacity deficits could in part be addressed by the private sector if it were sufficiently financially incentivised to invest in commercial agriculture. They contended that the trickle-down effect from commercial agriculture in terms of knowledge sharing and access to factor and producer markets could assist subsistent farmers in building sustainability into their productive and marketing capacity. Addressing this issue, IFAD (2017) noted that one of the main pillars of the original FADiP programme was to incentivise the private sector to partner with

subsistent farmers in joint venture companies; this was abandoned early on as neither farmers or the private sector wanted to partner each other.

In commenting on the option of providing dedicated agricultural lending to farmers other than through programme interventions, MoFA (2010) commented: “The Maldives does not have a specialised development financing institution to serve the agricultural sector, as is common in many other countries” (MoFA, 2010, p.16).

## 1.7. Chapter summary.

This chapter has set the scene for this research by providing a roadmap for its organisation and rationale, and an indication of my position within it. A contextual overview of Maldivian agriculture has also been provided where the sociocultural context of island farming indicated a preference for individualistic farming activity rather than the MoFA/donor advocacy of collectivised agricultural activity. It could be argued that such an approach contributed to the diminishment of capacity building and unsustainability of agriculture as farmers were unable to gain sufficient traction with the prescribed institutional interventions; this invariably led to disappointing outcomes for all parties.

Having introduced this research, chapter two looks at the relevant literature that informs the context of this research and shapes the forward investigation.

# Chapter 2. Literature Review

## 2.1. Chapter introduction

The purpose of this chapter is to critically review the literature relating to the primary research question and accompanying supporting questions. For ease of reference, the research questions are noted below:

Main research question:

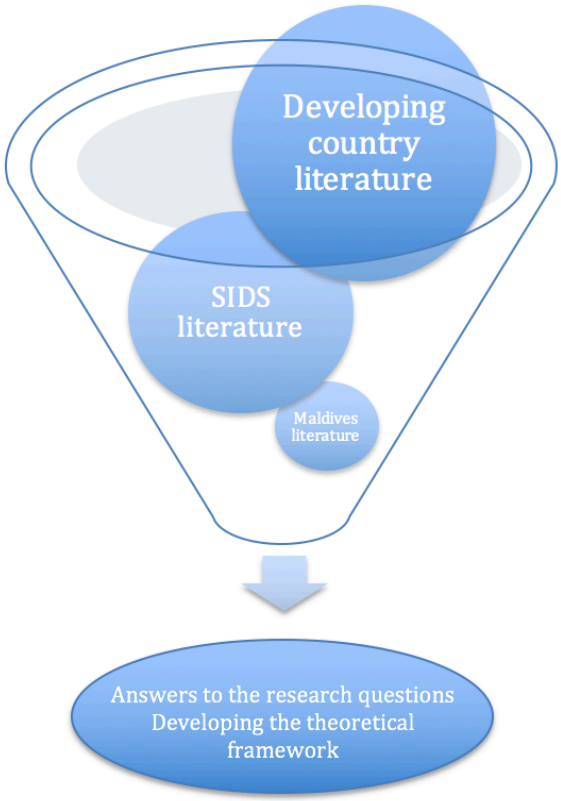
- *How can farmers in the Maldives build agricultural capacity through sustainable means?*

Supporting questions:

- *What do farmers in the Maldives understand by the terms 'sustainable agriculture', and 'building capacity' in agriculture'?*
- *What are the key factors encountered by farmers in the Maldives?*
- *What do farmers in the Maldives believe will help build agricultural capacity through sustainable means?*

A critical analysis of the relevant literature formed the basis of the theoretical framework. The literature reviewed used a granular analytic strategy which examined developing country literature, then moved down a level of granularity into SIDs literature, and then moved down another level of granularity into the specific Maldivian context. There was a dearth of targeted literature because of the specific, and distinct context of the Maldives. In view of this, I have woven together the relevant agricultural literature. Thus, using the metaphor of a funnel approach where information relating to the research questions was poured into the funnel in order to see what information was revealed. The information drew from literature that related to commentary on agriculture in developing countries, small island developing states, and literature specific to the context of the Maldives. The flow of information from the funnel assisted in developing a theoretical framework for guiding the current research where the research purpose and problems were addressed. Figure 15 demonstrates the funnel approach to the literature review.

**Figure 15. The literature review funnel: Theoretical framework**




The second section of this chapter explained how the literature was identified and sourced, and the third section looked at the understandings of the terms 'sustainable agriculture' and 'building capacity in agriculture'. Sections four, five, and six, examined the main economic, environmental, and sociocultural considerations as they related to the primary research question. Section seven of this chapter provided a chapter summary.

## 2.2. Searching the literature

The Google and Chrome internet search engines were the main source of obtaining access to publications, articles, and other literature. The searches were undertaken by using key strings of search words that included reference to developed country agriculture, SIDS (Small Island Developing State) agriculture, and Maldivian agriculture. Examples of key search words included: agricultural sustainability; building agricultural capacity; sustainable markets for farmers; family farm operations; individualism in farming; profitability for family farms; agricultural producer and marketing cooperatives; stigmatisation of farming; agricultural learning for school children; Government support for agriculture. From the articles and publications sourced through the search engines, a further scan of their bibliographies and references was conducted to further the search for relevant literature.

The literature search continued with the use of the Imperial College, London, online library services, the World Bank, Food and Agriculture Organisation (FAO), and International Fund for Agricultural Development (IFAD) data sites, and the use of sixteen online journals[5] where approximately 350 articles were examined based on their relevance to the main and supporting research questions, and on the most current content. Two master's theses that related to the research questions were also viewed.

A significant amount of literature that related to the historical perspective of agriculture in the Maldives was sourced in the libraries and bookshops of Male', while current Ministry of Fisheries and Agriculture (MoFA)/donor agricultural policy and programmes were sourced through MoFA. This comprehensive literature search was unable to identify any articles that dealt with how farmers in the Maldives could build agricultural capacity through sustainable means.

## 2.3. Understanding the terms 'sustainable agriculture', and 'building capacity in agriculture'

This section related to the first supporting question: *What do farmers in the Maldives understand by the terms 'sustainable agriculture', and 'building capacity in agriculture'?* The linkages between agriculture and the notions of sustainability and capacity building were not new, and dated to former times when permanent settlements superseded nomadism in providing shelter, security, and sustenance for populations. Lee and Daly (1999) noted that as lifestyles began to favour permanence over mobility, so the way in which food was secured changed from opportunistic hunting, to loosely planned production based upon such determinants as animal reproductive cycles, and seasonal weather patterns. Gowdy (1997) observed that the production cycles that emerged were based upon accumulated agricultural knowledge acquired from previous generations; he posited that this contributed to the practice of rearing and growing food becoming embedded within more permanent lifestyles. Thus, the linkage between agricultural advances assisted by generational knowledge was evident and served as an indication that the sustainability of

[5] Journal of Agrarian Change; Journal of Peasant Studies; Agricultural Systems; Food Policy; Agricultural Economics; Advances in Nutrition; Journal of Nutrition; Ecological Economics; Agriculture, Ecosystems & Environment; International Journal of Agricultural Sustainability; International Journal of Agriculture and Rural Development; Journal of Agricultural Economics and Rural Development; Journal of Agriculture and Environment for International Development; Economic Development and Cultural Change; The Journal of Environment and Development; and, The Australian Journal of Agricultural and Resource Economics.

agriculture was in some measure reliant upon the building of agricultural knowledge capacity.

As populations grew so the production of food was required to keep pace in order to feed them (Ruttan, 2000). Indeed, Thomas Malthus, the 18th century political economist and demographer, warned of the genocidal consequences if there was not enough food to feed an unchecked population growth (Petersen, 1999). A scan of more recent scholarship revealed Carson's *Silent Spring* book (Carson, 1962), which looked at environmental sustainability in the wake of the agricultural intensification of the Green Revolution. Freire's book, *Pedagogy of the Oppressed* (Freire, 1970), explored the constraining effect of hunger on learning, and phenomenological pedagogies for teaching poor farmers how to build their agricultural capacity. The 1972 Meadows report, *Limits to Growth* (Meadows et al., 1972) examined variables such as food production within modelling based upon rapid economic and population growth set against a finite resource base. And Conway's book, *The Doubly Green Revolution: food for all in the 21st Century,* offered a critique of the Green Revolution, and suggested how to address its strengths and inadequacies in order position conservation, productivity and social equity as equal partners in advancing global efforts to feed more people (Conway, 1998).

The presence of eminent scholarship relating to capacity building for more sustainable agriculture was found to be extensive during this literature review. Whilst essential in establishing a contextual base for understanding these subjects, a more channelled view was adopted in attempting to answer the research questions. In doing this, the green revolution commencing in the sixties, and livestock revolution commencing in the seventies, provided examples of the drive towards an agricultural development that boosted productive capacity with the aid of technological innovation.

**Developing countries:** The success of the green and livestock revolutions was centred on productivity gains in grains, meat, milk, eggs, and fish, which provided greater varieties of safer affordable food to expanding consumer markets over longer periods of time. In doing this, technological advance was harnessed to traditional farming practices with the assistance of renowned research institutes such as the Consultative Group on International Agricultural Research, and donors such as United States Agency for International Development[6] (Glaeser, 2011). These bodies funded the development and implementation

[6] Norman Borlaug, having worked with both agencies, was largely credited with pioneering the Green Revolution.

of the new technologies in conjunction with governments of host countries in which the technology was being trialled (ibid). Some of the most impressive results were seen in wheat production, where Mexico tripled its output in the sixties, and in rice varieties where the Philippines became self-sufficient in rice during the same period (Farmer, 1979; Gaud, 1968). Similar gains were noted in the livestock revolution where scientific advances in the selective cross breeding of livestock, combined with technological inputs, expanded meat, milk, eggs and fish production (Delgado et al., 2001). Conway (2012) noted that China and India both increased their meat production between 1980 and 2007 by 600% and 400% respectively. Delgado (2003) posited that unlike the Green Revolution, which Conway (1998) contended was supply driven in addressing widespread hunger, the Livestock Revolution was demand driven from the emerging economies of Brazil and China.

While both revolutions recorded impressive productivity gains, these were often accompanied by unanticipated environmental hazards through the overuse of chemical pesticides and synthetic fertilisers during production. Chemical pollution from pesticides and fertilisers permeated soils, water tables, air quality, and harmed biodiversity, and in some instances human health (Matson et al., 1997). Similarly, the intensification of livestock production led to increased greenhouse gas emissions from animal waste, and a depletion of natural pasture and forests as more land was required for grazing and for animal food production (Steinfeld, Gerber, et al., 2006). Whilst the environmental and health effects of both revolutions affected developed and developing countries alike, Pimentel (1996) argued that it was the rural poor of the developing countries that were least likely to recognise their harmful and long-term effects, and least likely to be able to mitigate these effects.

Pearse (1980) observed further setbacks during the revolutions when he noted a widening of inherent social and economic inequalities, particularly in Africa, where large sections of populations were unable to fuse with the technologies the revolutions offered. Freebairn (1995) contended that in some instances this led to exclusionary outcomes for farmers who became disconnected from agricultural support networks providing knowledge, funding, and market connectivity. Pearse (1980) summed up the green revolutions lack of equitability when he stated that: “When inequalities exist already, the Green Revolution’s strategy results in the persistence and generation of poverty for the majority of people in rural areas” (p. 207). Of the livestock revolution, Godfray et al. (2010), and Conway (2012), noted that many of the past practices that had contributed to agriculture’s past

sustainability risked becoming obsolete as new technologies came to the fore. They noted a decrease in harnessed power for ploughing, and the provision of fuel from dung as examples.

In mitigating some of the unfavourable environmental and socio-economic outcomes of the revolutions, eminent commentators such as Chambers and Conway (1991) and Pretty et al. (2003) discussed the notion of sustainable agricultural intensification. This was where the fusion of appropriate technologies and science was attempted with natural, human, and social resources to ensure ecological preservation of the environment, and a reduction in poverty. Conway (2012) identified four interrelated areas at whose intersection was the best chance of achieving agricultural sustainability. These were: (i) resilience where adaption methods were introduced to mitigate against the effects of exogenous shocks; (ii) equitability ensuring an equal spread of agricultural benefits; (iii) stability where production and market variables were controlled to ensure food flows and incomes could remain within viable boundaries; and, (iv) productivity where the margin between yield productivity and yield potential was reduced.

In considering the literatures various understandings of 'sustainable agriculture', and 'building capacity in agriculture' and how they applied to this research, researchers at The Agricultural Sustainability Institute of the University of California, Davis, suggested that sustainable agricultural capacity would be motivated by profitability, environmentalism, and an equitable distribution of social and economic benefit (University of California Davis, 2017). These motivations were of significance to MoFA and its donor partners (MoFA, 2010), however, we shall see what level of significance was attached to these motivations by participant farmers in this research. Perhaps Schaller's (1993) suggestion of what agricultural sustainability means bears merit when he noted that such understandings should not be captured, but rather contextually driven: "The concept of agricultural sustainability does not lend itself to precise definition, partly because it implies a way of thinking as well as of using farming practices, and because the latter cannot be specified as final answers (Schaller, 1993, p. 89 ). In exploring a deeper contextual understanding of building capacity for sustainable agriculture in the Maldives, the literature review next focusses on the relevant understandings of this subject within small island developing states (SIDS).

**SIDS:** The literature revealed a position held by many commentators that policy designed to promote sustainability in the developing world did not always fit within the context of SIDS.

Van der Velde et al. (2006) highlighted this point when they noted: “Since Barbados’, the international community has become more aware that traditional concepts of sustainable development are not applicable to SIDS” (p. 457) [7] . FAO (2004) were further concerned that agriculture was simply not always on the development agenda of the multilateral donor agencies assisting SIDS. They noted that in 1999, FAO called for a Plan of Action on Agriculture in SIDS in response to the “Lack of emphasis on agriculture, fisheries and forestry” (FAO, 2004, p. 4) in the Barbados Plan of Action.

Poonyth and Ford (2005), in their *FAO technical paper 7, Small Island Developing States Agricultural Production and Trade, Preferences and Policy*, noted that like the majority of economic activity in SIDS, agriculture was subject to the permanent vulnerabilities of smallness and isolation that had come to characterise many SIDS. Briguglio (1995) added that these vulnerabilities were exacerbated by exogenous factors beyond the control of SIDS such as global commodity pricing and transportation flows connecting SIDS to external markets. In examining potential impacts of smallness and isolation on agriculture in SIDS, Poonyth and Ford (2005) noted the following five main areas of concern: (i) climate change and sea level rise could affect seasonal growing patterns and land availability; (ii) limited natural resources may require additional farming inputs and new intensive production practices; (iii) small and undiversified economies may restrict access to factor and producer markets; (iv) high energy and transportation costs would impact production, processing, and market connectivity; and, (v) trade preference erosion had affected those SIDS that had focussed on monoculture export crops.

In summing up the feelings held by many agriculturists in SIDS regarding agricultural development, and by implication, the prospect for its sustainability, the Prime Minister of Fiji, at the Fifth Meeting of the FAO South West Pacific Ministers for Agriculture Conference in 2003, noted:

> Well before the arrival of western civilization, we had evolved efficient systems of agricultural production and fisheries that were appropriate for our needs and circumstances. But as our contact and involvement with the larger world increased, we found that the traditional ways were not enough. Development and the cash economy came. There were

[7] The 1994 Barbados Programme of Action for the Sustainable Development of SIDS sought to translate the recommendations of Agenda 21 into Action Plans. Agenda 21, chapter 17 G recognised the economic, social and environmental vulnerabilities of SIDS, and the need to develop sustainable responses to these vulnerabilities (UN Documents, 1994)

> the challenges of population growth, urbanization, over-exploitation of land and lagoons and threats to the environment. Trade brought imported processed food and produce. These began to replace more wholesome diets, which had sustained us for thousands of years (FAO, 2004, p.3)

**Maldives:** Early visitors to the Maldives such as Ibn Battuta, the 14th century chronicler and traveller, and de Laval, Moresby, and Young confirmed in Bell (1883) that the Maldives had the ability to feed itself with sufficient quantities of food, albeit of a limited nutritional content. Battuta in Husain (1976) described an abundance of coconuts providing milk, oil, honey, and confectionary, and further alluded to readily available fresh and dried fish delicacies. Bell (1883) added that a variety of fruits, vegetables, millet, and corn were also part of the local diet, but that the main starch staple of rice had to be imported from southern India, as it could not easily be grown in the Maldives. Maloney (1980) further commented on how Maldivian smallholders farmed tubas, fruit, and vegetables in family plots despite some reluctance at incorporating fresh fruit and vegetables into diets. With the clear indication of subsistence agriculture being sustained over a long period of time, Butany (1974) added that the Maldives could not only be self- sufficient in much if its current production but could also consider exporting some crops to neighbouring countries.

Maloney (1980) commented on agricultural capacity building in the Maldives through the dissemination of agricultural knowledge between mothers and their children whilst cultivating the household gardens. He further noted that much of this information was expanded upon by later generations as they came into contact with outsiders[8]. Butany (1974) further noted that the Department of Agriculture provided rudimentary farming advice to farmers albeit of limited technical content. More recent literature in the form of Government of Maldives (GoM), MoFA and donor policy and reports acknowledged the need to build agricultural capacity in the form of knowledge and training. One of the most notable documents articulating this view was the *Strategic Action Plan - National Framework for Development 2009 – 2013*:

> In the agriculture sector, reducing dependence on imports and improving national food security, strengthening organized farming and subsistence farming systems, applying appropriate technologies and developing the required market infrastructure are among the key goals to be implemented by the government (GoM, 2009, Sect. 3, p. 25)

In response to the call for greater emphasis on building agricultural capacity, MOFA and its donor partners, FAO, IFAD, and Asian Development Bank (ADB), embarked upon a

[8] The words 'outside' or 'outsiders' were common Maldivian terms referring either to locations or people that were either not Maldivian or, in some instances, not from the same island.

succession of policy and programmatic interventions that sought to build agricultural capacity beyond subsistence levels in order to create commercial agriculture that was sustainable (MoFA, 2010). This typically involved the formation of collective farming structures, such as producer organisations and cooperatives, where inclusion of all sectors of the community such as vulnerable groupings was encouraged. Legislation and regulation were also drafted to assist these interventions, particularly in the areas of plant protection against imported invasive species, and hazardous chemical usage in pesticides (FAO, 2012).

It appeared from the literature that a level of agricultural sustainability was evident as far back as Bell's (1883) commentary on sufficient local food availability. More recent literature indicates that local agricultural production had decreased per capita with the shortfall being supplemented through food imports (IFAD, 2008). In view of the Maldives increasing propensity for food imports, it was acknowledged that the food security status of the Maldives was premised upon its purchasing capacity from external suppliers, rather than its producer capacity from farmers. The issue of food security was examined in the next section.

## 2.4. Economic considerations

**Food security**

**Developing countries:** As we see below, the strengthening of food security was embedded within the majority of national development agendas of developing countries and was commonly associated with being a driver for building sustainable agriculture. The benefits of an enabling environment designed to capture existing agricultural capacity and expand its contribution to providing more local produce appeared to benefit those farmers who possessed the capacity to participate (FAO, 2006). FAO (2006) noted that national policy and programme initiatives were attempting to link more subsistence farmers to produce markets through collective cooperatives and farmers associations; they posited this would assist in strengthening levels of national food security.

The 1996 FAO World Food Summit enshrined the concept of food security in its Plan of Action where sustainable agriculture and rural development were inextricably linked through their desire to promote access to food choice (FAO, 2006). The FAO definition of food security from the 1996 World Food Summit noted:

> Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life (FAO, 2006, p. 1)

Smith et al. (2000) posited that food security was essentially an economic consideration as economic growth would be the most likely vehicle leading to its improvement. FAO et al. (2013) elaborated on this consideration and discussed food security within a varied remit that embraced political, social, technological, economic, and environmental considerations that were rooted in the further considerations of access; availability; utilization and stability. In addition, FAO et al. (2013) highlighted the differentials of food security as it addressed different groups in different situations in different developing countries.

FAO et al. (2013) posited that food security resulted in a series of benefits that included four main areas: (i) increased availability of national food stocks either through production or importation; (ii) increased food accessibility where incomes were able to cover the procurement of food along with other needs such as housing, health, and education; (iii) increased food utilization where balanced diets improve nutrition and health; and, (v) increased stability where risks relating to the production and marketing of food such as those relating to severe weather and erratic markets could be minimised.

Where food security is not achieved, a state of food insecurity is said to exist (Parliamentary Office of Science and Technology, 2006). Clover (2003) asserted that food insecurity was rooted within the politicisation of hunger. Drèze and Sen (1991) appeared to concur with this line of thinking when they posited that the impacts of hunger, such as malnutrition and undernourishment, often involved manipulation of political controls affecting the determinants of food demand and supply. Manipulation could include: shortages of labour through poor labour codes (Hurst et al., 2005a); distortion of markets through subsidies, tariffs and quotas (Poonyth & Ford, 2005); and, a lack of access to finance for agricultural investment (ibid). Clover (2003) posited that the manipulation of demand and supply determinants then created barriers to food security, and drivers towards food insecurity.

**SIDS:** Set against expanding populations of nationals, visitor arrivals, and migrant labour, the *Food Insecurity and Vulnerability Information and Mapping Systems*[9] (FAO, 2004) noted declining food production in SIDS and rising food imports had resulted in up to 92% of SIDS being subject to food vulnerability; this was where national economies were unable to service the foreign exchange bills for imported food and, the nutritional deficit increased through imported processed food items (ibid).

[9] These systems focussed on disseminating information about food insecurity and vulnerability with a view to rapidly identifying those areas most at risk (FAO, 2004)

According to the FAO (2016a), the trend for food importation amongst SIDS had increased significantly between 1990 -2011 such as in the case of Caribbean where 45% of available food was imported in 1990 and 67.5% imported in 2011. Similarly, in Pacific SIDS, 40% of available food was imported in 1990, whereas 60% was imported in 2011. Agricultures contribution to real GDP was also noted as having reduced in SIDS with expanding tourist industries. In the case of St Lucia, the real GDP contribution from the agricultural sector between 1990-2013 had declined by a staggering 79% (FAO, 2016).

Erosion of preferential access to export markets. In their discussion on the constraints affecting food security in SIDS, Poonyth and Ford (2005) contended that declining export markets for primary cash crops had been affected by the erosion of preferential trade agreements. They posited that such erosion was a response to variables such as economic downturns in developed countries, and a concentration of trade and production centres closer to the main developed country markets. Ford et al (2007) noted the erosion of preferential trade between Caribbean SIDS and the European Union in the supply of bananas and sugar under the EU/ACP Lomé Agreement where both products were not always being absorbed by the European countries. Ford et al. (2007) further posited that the reform of national agricultural policies espousing the export of monoculture crops as a panacea for sustainable agriculture had also been reconsidered; this had reduced the supply of available produce from SIDS to external markets.

Food price spikes. Many SIDS were particularly vulnerable to the global food price spikes between 2006 and 2011 through their over dependency on food imports. This in turn impacted national food security as governments purchasing capacity for more expensive food imports was diminished (Headey & Fan, 2008). According to the World Bank's Food Price Index 2011, staples recorded significant rises with maize rising 74%, wheat by 69%, soybean by 36% and sugar by 21%, between 2010 and April 2011 (World Bank, 2011a). Causes for these price rises were attributed mainly to erratic weather resulting in crop failure, fuel price hikes affecting production and transportation costs, increasing production of bio-fuels supplied by intensive arable production, country restrictions on food exports, market speculation in food commodity trading, and the legacy of the 2008 banking crisis (World Bank, 2011a).

The effects of the food price instability upon those SIDS importing the majority of their food requirement was severe, especially where governments had fewer mechanisms in place, such as subsidies, to mitigate higher food prices and food shortages (FAO, 2011b). As a

result of the 2010/11 food price spikes, the World Bank estimated an extra 44 million people, mainly from least developed countries were pushed into extreme poverty (Ivanic et al., 2012).

**Maldives:** Food security in the Maldives typified that of many SIDS where limited agricultural productive capacity and a dependence upon food imports provided food for an expanding population. Consequently IFAD (2013a) noted that in line with many SIDS, Maldivian food security was predicated on purchasing capacity directed towards external suppliers rather than local producer capacity. The Maldives were then net food buyers.

Food imports. The World Trade Organisation estimated that 90% of the national food requirement for the Maldives was imported (WTO, 2009), with the remaining 10% provided by local production. The staples of coconut and fish were locally produced; however, the staples of wheat flour, rice, and sugar were imported along with non-staples such as fruits, vegetables, diary, eggs, and meat (FAO, 2012a). All food imported into the Maldives was duty free with the exception of watermelons, bananas, mangoes, papaya, and tuna, which attracted a 15% import duty[10] (Maldives Customs Services, 2017). This duty was imposed because these products were also produced in the Maldives. It was unclear whether these protectionist tariffs encouraged the expansion of local productive capacity or simply acted as a guarantee to protect existing levels of local production against imports. Table 1 indicates the value and composition of imported food 2013 – 2016.

**Table 1. The value and composition of imported food to the Maldives 2013 – 2016.**

| *In millions of USD* | | | | |
|---|---|---|---|---|
| | **2013** | **2014** | **2015** | **2016** |
| **Total Food Imports CIF, USD** | **378.9** | **407.6** | **405.9** | **429.6** |
| Price Administered Staples | 39.7 | 32.9 | 34.7 | 34.9 |
| Vegetables, Root crops and Spices | 48.5 | 52.0 | 53.3 | 56.9 |
| Fruit, Nuts and Seeds | 40.5 | 45.2 | 47.0 | 51.0 |
| Meat, Fish and Seafood | 78.4 | 83.2 | 80.9 | 84.3 |
| Dairy and Egg | 51.5 | 58.2 | 55.9 | 57.8 |
| Beverages and Confectionaries | 74.2 | 83.6 | 81.8 | 89.3 |
| Other Food Items | 46.0 | 52.7 | 52.1 | 55.3 |
| *Source: Maldives Customs Services, 2017.* | | | | |

[10] Pork and alcohol import duties were each at 50%.

The State Trading Organisation (STO) of the GoM is the main importer of staples to the Maldives with an estimated two month reserve of food in three warehouses in Male', and a further ten warehouses throughout the country (FAO, 2012a). Despite this storage provision, FAO (2012a) contended that there were insufficient food stocks to accommodate a food shortage emergency.

Domestic production. Butany (1974) provided a candid description of Maldivian agriculture in the early seventies when conducting the *Agricultural Survey and Crop Production Report* for the GoM on behalf of FAO. He noted:

> The survey of agricultural conditions has shown that agriculture in the Maldives is in a primitive condition with the crops, mainly minor millets and some tubers, being grown exclusively by human labour and without the use of even simple hand implements and tools, and without the addition of organic or inorganic fertilizers or spraying of pesticides against pests and diseases…Soils are exhausted through continuous cropping and non-replenishment of nutrients. Returns are extremely low and the success of crops uncertain, and dependent upon the environment. In certain years crops are totally lost through epidemics of pests and diseases (Butany, 1974, p.27)

Despite the poor state of agriculture as noted by Butany in 1974, FAO (2011) noted that there were 7,000 ha. recorded as cultivated land of which 4,000 ha. was arable and temporary grazing, and 3,000 ha. permanent crops such as coconut and areca nut. Table 2, indicated the peak production periods between 2008-11, and the decline in production from that period. The reasons for the significant declines in quantity in 2012 and onwards were noted by MoFA to be unclear although poor accuracy in data recording appeared to be the favoured explanation. MoFA has since introduced new data recording templates for recording production both on the producer islands and as produce arrives in Male' for sale in the market. However, the templates still rely on human input and as such have experienced some challenges bringing their accuracy into question.

**Table 2. Production quantities and values traded through the Male' market 2004-2016.**

| Year | Quantity in KG | Value in UKSTG. |
|---|---|---|
| 2004 | 8,647,506 | 4,512,772.00 |
| 2005 | 9,486,216 | 5,346,020.00 |
| 2006 | 7,875,993 | 4,366,550.00 |
| 2007 | 6,670.045 | 3,846,153.00 |
| 2008 | 10,480,083 | 6,771,219.00 |
| 2009 | 8,188,400 | 7,207,688.00 |
| 2010 | 8,293,088 | 8,409,315.00 |
| 2011 | 10,821,996 | 8,461,028.00 |
| 2012 | 5,385,853 | 4,442,950.00 |
| 2013 | 1,477,512 | 1,729,640.00 |
| 2014 | 2,483,194 | 1,654,488.00 |
| 2015 | 4,965,522 | 3,563,188.00 |
| 2016 | 4,728,967 | 3,761,331.00 |

*Source: Ministry of Fisheries and Agriculture, Maldives, 2017.*

Price shocks. Price shocks were experienced in the Maldives during 2008 and 2011. In 2011, the World Bank recorded an average increase of 25% on food items compared to the previous year, which led the GoM to increase the price of staples to cover its own external forward buying positions (World Bank, 2011a). The World Bank (2011b) attributed the jump in prices to increasing global commodity and transportation costs consistent with the global food price crisis, and the 20% effective devaluation of the Maldivian currency in April 2011; this had the effect of making food imports more expensive into the Maldives (World Bank, 2011b). Resulting food price riots took place in Male' during May of 2011, with many people stating that they could not afford to feed their families (Freedom House, 2012).

Sustainable food security. While immediate food demand appeared satisfied by high levels of food imports, Carrasco and Mukhopadhyay (2012) argued that the upward trend of South Asian food and transportation prices was likely to place added pressure on the pricing of food imports. In recognising the unsustainability of high levels of food imports, the GoM prioritised building sustainable capacity in agricultural practices within the *Agricultural Development Master Plan 2010 - 2025*, the *Strategic Action Plan - National Framework for Development 2009 – 2013*, and the *2013 Economic Diversification Strategy.*

Economic diversification. In the *Agricultural Development Master Plan 2010 - 2025*, the benefits of economic diversification into agriculture were noted:

> The agricultural sector is envisaged to evolve as the third important driving force in the economy after tourism and fishery in expanding livelihood options for the rural people, in enhancing employment and income opportunities, and in improving food security and nutritional status of the Maldivian people (MoFA, 2010, p. ix).

In 2013, the Ministry of Economic Development in its *Maldives Economic Diversification Strategy* clearly defined its expectation of the agricultural sector in contributing to economic diversification, and in reducing the country's reliance on food imports. In doing this, the strategy detailed the following areas to be addressed:

- Increase productive capacity of organic fruit and vegetables
- Introduce standardisation codes for production and marketing and establish producer links to the tourist market.
- Develop commercial egg production with accompanying support services such as feed mills and training for farmers
- Branding of local produce as high quality
- Invest in supporting infrastructure such as power, harbours, and water supply
- Establish improved access to finance for smallholders
- Capacity building through farmer training courses and extension services
- Increase access to land for farmers.

The Economic Diversification Strategy of 2013 highlighted the need to adopt a commercial approach to agriculture to ensure its sustainability, and thus its participation in economic diversification. Commercial approaches to agriculture had been articulated as far back as 1974 by Butany, by Maloney in 1980, by the Asian Development Bank in 2005, *Commercialisation of Agriculture Report*, and latterly by the MoFA/IFAD Fisheries and Agricultural Diversification Programme in 2009. The message of commercialisation consistently noted that the productive capacity of farmers needed to be strengthened in order to more effectively link farmers to the tourist and domestic markets (IFAD, 2008). In 2012, FAO noted that agriculture had not commercialised its activity sufficiently to suggest any increased levels of agricultural sustainability. The agricultural commercialisation strategy had further failed to diversify the economy away from its reliance on tourism and fishing (FAO, 2012a).

**Producer and factor markets**

**Developing countries:** In excess of two billion people in developing countries derived livelihoods from agriculture, where the translation of their productive effort into financial gain was mainly undertaken by trading produce in the market place (FAO et al., 2013). Any dislocation from the market could, therefore, have profound effects for farmers including their exit from farming altogether, and the exacerbation of poverty levels (IAASTD, 2009).

Laissez-faire and new development economics. The 20th century laissez-faire approach espousing unfettered market access in order to connect with global trade resulted in many smallholders, particularly in sub Saharan Africa, being marginalized from markets that had become dominated by larger producers (IFAD, 2010; Jomo & Fine, 2005). IFAD (2010) noted that the larger producers had the technological capacity to capture the growth benefits of connecting with global markets, whereas small farmers that did not possess such capacity were often excluded. The Post Washington Consensus and the new development economics of the 21st century sought to redress the demand led laissez-faire approach of getting the prices right, by accepting that it had imperfections (Jomo & Fine, 2006). The emphasis shifted to supply led markets, which espoused getting the product right for more localized markets (Jomo & Fine, 2005). In doing this, local producer and marketing associations were encouraged to exploit their localised advantage in providing high specification produce to domestic and regional markets (World Bank, 2007). It was believed that this would build localised productive and marketing capacity for those farmers involved.

Value chains. The World Bank (2007) noted that value chains were of benefit in connecting producers to consumers where producers could exploit value addition processes in order to sell produce. Kaplinsky and Morris (2001) defined value chains as the process where value may be added to a product from when it is conceived, produced, consumed, and disposed of, with the value being retained by those who have added to it during the process. It terms of agricultural value chains, this process was often referred to as the 'farm to fork' value chain. In extracting the maximum value from value chains for farmers, Conway (2012) suggested that components of value chains such as commodity exchanges, food standards, niche markets, farmer cooperatives, and contract farming, could all extract value benefit for those involved in their respective operation.

Food standards. Food standards were of increasing concern to all markets whether domestic commodity exchanges supplied by smallholders, or export markets supplied by commercialized agriculture (Jongwanich, 2009). Jongwanich (2009) and Narrod et al. (2009) contended that variables such as pesticides used during production, and preservatives and flavourings used during processing, were of increasing interest to a market that had become more discerning over the food quality it was consuming. The proliferation of organic and free range food options in supermarkets in the nineties had added to this debate, as had ethical food sourcing through fair trade practices (ibid).

Renard (2003) contended that by complying with the food standards that the market required, smallholders would achieve increased access to a wider variety of markets. He added that if smallholders were unable to comply with food standards due to a lack of technical or financial capacity, they should be assisted by external sources such as government, donors or non-governmental organisations (NGO's). In the case of the fonio[11] value chain in Mali, Mitchell and Coles (2011) highlighted how the Overseas Development Institute and the International Development Research Centre had worked with local partners during 2008/9 to capitalize the production and processing components of fonio so that precooked fonio could be supplied to domestic supermarkets and regional export markets. Mitchell and Coles (2011) contended that this increased the livelihoods of the women working in the production and processing phases of the fonio value chain[12].

Farmer cooperatives. Narrod et al. (2009) argued that smallholders could extract more value from value chains if they joined a collective production or marketing body such as a farming association or cooperative. In this way, production functions could be consolidated with a chance of achieving savings through economies with discounts for the bulk purchasing of farming inputs (Bingen et al., 2003). However, the growing individualistic trend in agriculture, as noted by FAO (2004), indicated a swing away from agricultural cooperatives, particularly in view of their poor recent history characterised by mismanagement and membership dissatisfaction (Trewin, 2004).

Agro dealers. Kelly et al. (2003) posited that the ideal agro dealer was a rural shop owner, who was trusted by the community to source quality inputs such as feed, seed, and fertilizer, and supply these inputs at competitive prices to small farmers. They further contended that agro dealers should be able to dispense knowledge on such matters as product usage and storage, as well as advise on best farming practices involving planting, growing, rearing, and harvesting. Alpert (2011) noted that the introduction of agro dealers during Malawi's market liberalization in the nineties had seen the Malawian Rural Agricultural Market Development Trust support in excess of one thousand agro dealers with basic training.

Kelly et al. (2003) noted that despite the benefits to rural farming communities provided by agro dealers, their agency activity had reported late payments to input manufacturers and

[11] Fonio is a small variety of millet grown as a staple by farmers in West Africa.
[12] Mitchell and Coles reviewed the case study by Bougouna, S. and Alpha, O. K. (2010) Enriching Collective Action – The Fonio Value Chain in Mali, Association Malienne d'Eveil au Développement Durable, Mali

slow deliveries of inputs to farmers who had paid in advance. Chinsinga (2011) continued to observe the dissatisfaction with some agro dealers when he added that some agro dealers became a conduit through which elites controlling inputs such as grain, seed, and fertilizer exerted influence with farmers in pursuing their own political and economic agendas. Chinsinga described the capture of the *Farm Input Subsidy Programme* in Malawi by elites as an example where economic benefit was actively pursued at the expense of farmers.

Agricultural subsidies. Wiggins and Brooks (2010) posited that subsidies in developing countries impacted producer and factor markets in varying measure depending upon how they were implemented. They noted they could be controversial because of their invariable politicization where they would be quickly introduced and implemented to capture votes and sway public opinion. Wiggins and Brookes (2010) posited that subsidies distorted agricultural markets in three main ways: (i) they were expensive and are not affordable over the longer term; (ii) they utilized funding that could be better directed towards developing agriculture, and (iii) they provided cheaper products that encouraged over usage, as was sometimes the case with fertilisers and pesticides. Conversely, Dorward et al. (2004) noted that agricultural subsidies could: (i) act as a catalyst for developing production; (ii) provide affordable inputs; and, (iii) act as a support mechanism in the event of market failure.

A middle ground in support of subsidies came from Wiggins and Brooks (2010) who suggested that 'smart' subsidies where a way forward where they could assist in alleviating the impacts of market failure in concert with other economic and social considerations. Chinsinga (2011) added that 'smart' subsidies could be beneficial if they were short term with a clear exit strategy, and directly targeted at farmers through voucher systems rather than directly administered through government offices with sometimes hidden agendas.

Infrastructure connecting producers to markets. FAO et al (2012) contended that the development of infrastructure was significant in improving producer linkages to the market as it attempted to increase access and choice whilst reducing costs. Birthal et al. (2007) noted the example of improved access to roads for Bangladeshi smallholders that had increased their access to markets. Njenga (2009) further noted that mobile phone usage by smallholders in Kenya had facilitated mobile banking thus providing faster transactions and lower bank costs. While the development of government funded infrastructure utilised by the agricultural sector was evident, FAO et al. (2012b) noted that it was the private sector that now powered increasingly more of its investment and operation, particularly where technological innovation was key to its operation.

**SIDS:** Export markets. In the seventies, the United Nations Agencies such as IFAD and FAO, and their sister institution, the World Bank, had tended to promote the merits of export orientated niche markets for SIDS that were capable of generating valuable foreign exchange for the exporting country (Poonyth & Ford, 2005). Preferred exports typically consisted of monoculture primary crops such as fish, sugar, bananas, cocoa, and coffee (ibid). Sturton (1992) noted that crop types differed depending on export determinants such as strong demand and preferential trade access. He noted that in Tongatapau during the early nineteen hundreds the main export crop had been copra, which had changed to bananas in the seventies, watermelon and coconuts in the eighties, and squash in the nineties. Van der Velde et al. (2006) added that this usually resulted in the abandonment of one crop in favour of another rather than the simultaneous production of different export crops.

Briguglio (1995) contended that the lack of product diversification in SIDS in favour of export specialisation was unsurprising given the limited resource base of most SIDS. He further added that such specialisation limited the choice of the products SIDS were able to offer the market, thus diminishing the presence of SIDS in global markets.

Ford et al. (2007) noted that many export markets for SIDS had fallen away partly due to increased production costs in SIDS where scarcity of imported inputs had led to lack of competition and inflated pricing. They posited that this had led to a general decline in agricultural production. Briguglio (1995) added that pricing connected to imports or exports to and from SIDS was dependant on exogenous factors such as global demand and fuel costs over which SIDS had little control. He added that this resulted in most SIDS being price takers where they had little influence over the prices they paid or sold goods for due to the comparatively small volumes they traded on the global market.

Transportation. The isolation of SIDS with their oceanic surrounding magnified their dependence on sea and air transportation in connecting with external markets for input supplies and product sales (Briguglio, 1995). Becker (2012) highlighted this characteristic as the “tyranny of distance” (p.1) in his discussion on Pacific SIDS, where he posited that markets were affected by diseconomies of scale in production as a result of their isolation from main factor and producer markets. FAO (2004) added to the discussion when they contended that agricultural inputs were typically required in small quantities resulting in higher unit costs for transportation, or in bulk purchases where additional storage costs are incurred. Briguglio (1995) contended that a similar rationale applied to exports from SIDS

where high unit costs in transportation were due to small and mixed cargoes, and the reliance of expensive imported fuel for shipping and air transportation. Briguglio (1995) added that additional transportation constraints affecting SIDS included poor access to international shipping routes, and in some instances, unfavourable weather conditions which proved hazardous to shipping.

Local markets and import substitution. Worrell (1992) contended that the small range of locally produced food in many SIDS resulted in import substitution being problematic, as there simply was very little substitute produce available locally. Becker (2012) concurred that this was in part due to small land resources, and further posited that the limited agricultural output of small populations rendered import substitution policy unrealistic. Where import substitution polices had been implemented through protectionist measures such as tariffs and quotas, Briguglio (1995) contended that narrow markets prevailed characterised by inflated prices for substandard locally produced goods. He further posited that this could result in parallel markets between locally produced and imported goods.

Economies of scale. Briguglio (1995) contended that economies of scale in production were difficult to achieve in SIDS where fixed costs such as those for infrastructure and training could not be sufficiently defused by the existent small sized markets. Poonyth and Ford (2005) added that the narrow domestic markets of SIDS discouraged investment in external technologies, which could reduce operating costs and improve quality. They further posited that even in the case of export orientated production where technology, investment, and market access were harnessed, the isolation and smallness of SIDS invariably inflated production and marketing costs.

**Maldives:** Local food markets**.** Butany (1974) referred to the Male' market throughout his *Agricultural Survey and Crop Production* publication alluding to its centrality for trading the majority of agricultural produce in the Maldives. He further noted the difficulty endured by farmers in physically connecting with the Male' market as long sailing times from production islands resulted in some product spoilage. Despite the presence of the Male' market as the national food trading hub, Maloney (1980) noted the paucity of marketing systems in the Maldives: "Of great significance is the absence of any marketing system for produce…" (p. 289). He explained that the Maldives did not have a bartering system where surplus and shortage items could be exchanged and suggested that GoM interventions supported by donor partners was necessary to redress this situation. In considering export markets, Butany (1974) reflected upon the trend in the seventies for developing monoculture crops

for export, particularly for maize, where he believed the productive capacity of Maldivian farmers could be sufficiently channelled in order to supply regional neighbours. Years later ADB (2005) contended that whilst agricultural markets in the Maldives were similarly framed within the context of those found in SIDS, there was an absence of a significant export market for agricultural produce[13].

The Male' fruit and vegetable market acted as the country's main trading hub for locally produced and imported fruit, vegetables, salad varieties, and spices (FAO 2012a). Smaller markets in regional centres such as Kulhudhufushi Island (Haa Dhaalu Atoll) in the north, and Hithadhoo Island (Seenu Atoll) in the south, also traded produce between neighbouring islands/atolls, and the Male' market (DNP, 2011). The main locally produced food items that were traded in the Male' market comprised: watermelon; cassava, taro, brinjal, young coconut; coconut; papaya; pumpkin; sweet potatoes; cucumber; banana; gourds (wax/bottle/snake); butternut; Chinese cabbage; yam; drumsticks; luffa; betel leaf; chilly; and, mango (DNP, 2011). MoFA (2010) noted that the produce traded through the Male' market was for domestic consumption. Appendix 1 shows locally produced agricultural products traded in Male' market by atolls in 2013.

ADB (2005) and MoFA (2010) noted that local produce was marketed in two main ways: (i) farmers selling directly to the market through farm-gate sales, or to wholesalers and retailers; and, (ii) farmers selling to agents, traders, or boat crew, who either paid the farmer when taking possession of the produce or agreed to remit funds to the farmer once the trader had sold the produce. MoFA (2010) noted that the fledgling commercial agricultural sector typically supplied high value niche products such as salad varieties either directly to resorts, or to retail outlets in Male'. In a few cases, MoFA (2010) noted that resorts produced some of their own food requirement such as salad varieties, fruit, and vegetables for use in the resort.

The value addition of local produce was negligible in the Maldives with small scale MoFA/donor led activities such as virgin coconut oil processing, and chilli paste and fried taro chip production being undertaken by community groups (MoFA, 2010). In the case of the Virgin Coconut Oil Project, the activity involved the extraction, filtration, bottling, and selling of virgin coconut oil as a beauty and massage product to resorts and to local retailers

[13] Small quantities of chilli and papaya were exported to regional neighbours but were not recorded within the agricultural statistics. The main food product exported by the Maldives was whole and processed tuna products.

(Live and Learn, 2015). This literature review was unable to find any documented outcomes for the value addition food processes in the Maldives, however, the fieldwork indicated that most of the value addition projects had now closed down after only functioning for a few years. Despite this situation, Beyer (2009) had noted that Maldivian agriculture could graduate from minimal cutting and trimming processes to value addition strategies incorporating; food handling; food preservation; product development; and, formulations for processing.

Imported food market. India, the United Arab Emirates, Sri Lanka and Singapore are the main suppliers of all foods to the Maldives (Maldives Customs Services, 2017) with their supply chains characterised by reliable delivery schedules, competitive pricing, uniform quality, and food safety. Imported fresh and frozen food includes: meat, diary, fruit, vegetables, spices, and fish products excepting tuna. Appendix 2 noted the importation of fruit and vegetables that were also grown in the Maldives. Once food product arrives in the Maldives, the efficiency of this supply chain continues through to the domestic market with established commercial food distributors providing cargo clearance and a continuation of quality assurance through cold storage and timely delivery to customers (ADB, 2005).

Table 3 indicates the value and percentage of food imports from exporting countries 2013-2016 (Maldives Customs Services, 2017).

**Table 3. Value and percentage of food imports from exporting countries 2013-2016.**

| *In millions of USD* | | | | |
|---|---|---|---|---|
| | **2013** | **2014** | **2015** | **2016** |
| **Total food imports** | **378.9** | **407.6** | **405.9** | **429.6** |
| India | 80.7 | 67.1 | 70.2 | 79.0 |
| UAE | 67.5 | 79.1 | 75.6 | 74.6 |
| Sri Lanka | 41.4 | 47.6 | 49.6 | 47.6 |
| Singapore | 33.7 | 37.0 | 33.6 | 30.5 |
| Other countries | 155.6 | 177.0 | 176.8 | 197.9 |
| **Percentage of value** | | | | |
| India | 21.3% | 16.5% | 17.3% | 18.4% |
| UAE | 17.8% | 19.4% | 18.6% | 17.4% |
| Sri Lanka | 10.9% | 11.7% | 12.2% | 11.1% |
| Singapore | 8.9% | 9.1% | 8.3% | 7.1% |
| Other countries | 41.1% | 43.4% | 43.6% | 46.1% |
| **Total** | **100.0%** | **100.0%** | **100.0%** | **100.0%** |

*Source: Maldives Customs Services 2017.*

ADB (2005) stated that customer preference in terms of purchasing produce was reliant upon product quality, price and supplier service. MoFA (2010) noted that while local production could provide a comparable quality and competitive price to food that was imported, its erratic production schedule hindered continuity of supply, which deterred food distributors and customers reliant upon regular deliveries, particularly the tourist sector. MoFA have attempted to address this shortfall through the establishment of agricultural cooperatives, however, little appears to have changed (IFAD, 2017).

Agro dealer markets. Inputs such as fertilisers, herbicides, pesticides, seed, tools, and equipment, were imported directly by larger individual farmers, or through the growing number of Male' based agro dealers. In the case of agro dealers, the inputs were distributed via their shops, or through agents who either visited or were located on the islands (MoFA, 2010). MoFA (2010) noted that although many agro dealers attempted to assist farmers with technical advice on product usage and storage, their advice was: "Inadequate given the limited technical expertise of their staff and their business orientation" (p.16). The importation of agricultural inputs was noted in Appendix 3.

Value chains. The GoM recognised the need to build agricultural capacity in the form of productivity gains, and link this to the market through value chains where value could be extracted in areas such as processing, specialist packaging and refrigerated transportation (IFAD, 2008). This sentiment was articulated in the *Strategic Action Plan - National Framework for Development 2009 – 2013*, where the dislocation of many farmers from markets was noted, and solutions requested to rectify the situation. In responding to this situation, value chain programmes were introduced by MoFA, and supported by IFAD, where the strengthening of productive capacity was planned in order to develop branded value-added niche products for domestic and export markets (IFAD, 2008). The results of such programmes generally had limited outcomes where no marked increase in either value added niche products or market connectivity was observed (IFAD, 2017).

Transportation. A lack of inter-island and inter atoll transportation connecting farmers to the markets was acknowledged by MoFA as a barrier in developing agricultural markets (ADB, 2005; MoFA, 2010). In response to the wider challenge of a large spatial disbursement of the people and land, most national development plans for the Maldives incorporated improved transportation networks with an increased frequency of service and capacity. Nowhere was this more clearly articulated than in the *Strategic Action Plan - National*

*Framework for Development 2009 – 2013,* where an improved transportation network was highlighted as a key pledge of the GoM (GoM, 2009).

In 2012, the Ministry of Transport and Communication noted that the Integrated Public Transport Network had been successful in delivering increased national transportation coverage with more passengers and cargo being transported (DNP, 2011). However, in the same year, FAO (2012a) posited that, "There is also a clear shortfall in the infrastructure critically needed for agriculture development such as transport, harbours, and jetties" (p. 11).

**Agricultural finance.**

**Developing countries and SIDS:** Concessionary finance for the agricultural sector of developing countries, including SIDS, had been highlighted since the 1950's, where bi-lateral and multilateral lending to support agricultural credit programmes was noticeably evident (Coffey, 1998). Between the 1950's and the 1980's it was estimated that the World Bank alone had disbursed in excess of US$16 billion to support rural credit programmes offering loans with concessionary interest rates, moratoriums on the repayment of credit and principal, and less than strenuous penalties in the event of default (ibid). Credit programmes were administered through Agricultural Development Banks that dominated much of the agricultural lending to farmers in sub Saharan Africa, and through micro finance institutions that became commonplace in the rural communities of South Asia (Hossain, 1998). While the Agricultural Development Banks provided concessionary interest rated loans secured against agricultural assets, micro credit typically provided small, unsecured loans at market rates [or higher] to groups of community farmers. Collateral from the community farmers took the form of communal familiarity where those community members known for being reliable managers of money and hard workers were extended credit (Khandker, 1996).

During the latter part of the 1980's, a paradigm shift occurred with agricultural lending in developing countries, as lenders such as the World Bank and the International Monetary Fund began to decry planned centralized lending in favour of free market finance undistorted by concessionary lending conditions (Coffey, 1998). While this new market approach was subject to market failures Peck et al. (2005) posited that a broad model for agricultural finance could be extracted from the two paradigms where their successful combination could be capitalized upon.

**Maldives:** Institutional finance was largely absent from funding the agricultural sector in the Maldives as it was considered a high-risk low profit activity (MoFA, 2010). This sentiment was based on the historically poor and largely undocumented financial performance of the agricultural sector, the physically challenging environment in which agriculture operated in the Maldives, and on borrowers' inability to supply sufficient collateral loan coverage (World Bank, 2011). Reinforcing the lack of appeal agricultural activity had to Maldivian institutional lenders, FAO (2012a) noted:

> Agricultural credit is not among the priorities for micro-finance institutions, as it is perceived as a low profit sector. Commercial bank loans for agriculture amount to a negligible proportion (less than 1%) of the total loans granted to all the major economic groups (p.11).

In response to the lack of agricultural lending, MOFA and its donor partner IFAD, attempted to negotiate credit lines through the Bank of Maldives, and the Maldives Finance Leasing Company for farmers under the FADiP project where concessionary interest rates and low collateral requirements featured (IFAD, 2008). Unfortunately, neither of the institutional partners felt it was worth their while participating in such schemes (ibid). Further concessionary lending to farmers had been attempted through the FADiP loan opportunity, and through bilateral arrangements with agencies such as the Kuwait Fund. However, the outcomes of these initiatives remain largely undocumented (ibid). MoFA (2010) noted that currency shortages, particularly of US Dollars, further exacerbated institutional financial support to farmers, as US Dollar reserves gravitated to where maximum returns could be generated such as in the tourist sector. This caused some hardship to farmers, as imported inputs were US Dollar denominated, whereas all produce sales in the Maldives were sold in Maldivian Rufiyaa.

**Profitability in agriculture.**

**Developing countries:** Within the definitions of sustainable agriculture, profitability or economic viability are integral meanings, with many farmers in the developing world noting the absence of profitability as a disincentive to participating in agricultural activity (World Bank, 2007). Profitability is then widely acknowledged to be a key motivator for engaging in agricultural activity in developing countries (ibid).

In his publication, *the economic lives of smallholder farmers*, Rapsomanikis (2015) noted that building agricultural capacity towards profitability involved farmers trying to operate as entrepreneurs whereby they were often required to access capital in order to fund productive assets such as machinery, seed, fertiliser, and equipment. The World Bank (2007)

noted that capacity building towards profitable agriculture was not confined to the monetary acquisition of materials but extended to negotiation with transportation agents and producer markets for the sale of crops. In commenting upon the entrepreneurial capacity required by farmers, Rapsomanikis (2015) noted: "They [farmers] make decisions and take both risks and profits" (p.1). He continued his commentary on the threats to profitability: "As markets change, economies of scale in skills and technology, finance and access to capital and the organisation and logistics of trading, marketing and storage, make smallholders unprofitable" (p.13).

**SIDS:** Agricultural profitability in many SIDS was often hindered by factors arising from SIDS' smallness and isolation. Factors included a narrow economic range where the agricultural resource base was limited and small markets existed (FAO, 2004). In the case of some SIDS, profitable export industries of monoculture crops had been established through preferential trade agreements with developed country markets (Van der Velde et al., 2006). However, as consumer preferences changed, and trade agreements expired, many of the export orientated farms either disappeared or scaled back to serve small domestic markets (ibid). Poonyth and Ford (2005) noted that despite the demise of export orientated crops in many SIDS over the last ten years, the residual farming assets could be redeployed to the semi subsistence and subsistence agricultural sector where most SIDS farming activity resided. This, they contended could assist local farmers towards financial sustainability.

**Maldives:** In the Maldives, there was little evidence of profitable agriculture being recorded, with recordkeeping being noted as poor by farmers and cooperatives alike (MoFA, 2010; IFAD, 2013). However, the enduring presence of subsistent and semi subsistent farmers, and the emergence of a fledgling commercial sector, suggested that a level of financial sustainability was evident. Certainly, institutional assistance from MoFA and its donor partners to subsistent farmers was geared towards economic viability where technology inputs in the form of greenhouses with hydroponic systems were coupled with collectivised approaches to production and marketing designed to achieve cost economies and production efficiencies (UNDP, 2013; IFAD, 2008). However, the outcomes were not always as planned. In commenting on the performance of the FADiP programme IFAD (2013) noted: "There has been little progress in achieving new market linkages, generating profits, and bringing about the intended outcomes" (p.3). Further comment relating to the activities of cooperatives commented upon unprofitable strategies as in the case of a feed mill purchase

for an egg laying unit (IFAD, 2013). As little documentary evidence relating to agricultural profitability is available, its status remains unclear.

**Institutional capacity**

**Developing countries and SIDS:** Institutional capacity deficits were noted as being commonplace in most developing countries, including SIDS, and often resided in bloated and inefficient bureaucracies characterised by inherent technical knowledge deficits, budgetary constraints, corruption, and in some instances, a lack of political will to proceed with implementation (Alonge, 2004). According to Ferguson (2009), many sub-Saharan countries were littered with such phenomena where national development agendas were characterised by a civil service ineptitude and manipulated by vested political interest. He added that one of the most common manifestations of such phenomena was a slow pace of programme and project implementation.

**Maldives:** The lack of institutional capacity found in Maldives was commonplace to many SIDS. FAO (2012a) elaborated on the institutional capacity deficit when they referred to the poor state of institutions charged with assisting the development of sustainable agriculture in the Maldives. They noted that in the agricultural sector, extension services, research capabilities, data collection and analysis, disease and pest control, and private sector participation, were all found to be lacking.

In the *Agricultural Development Master Plan Maldives 2010 – 2025*, MoFA (2010) noted that extension services neither possessed the technical ability or geographical outreach to assist farmers: “The present employed staffs are neither sufficient in number nor capable in undertaking their mandated duties and functions” (p. 12). This was in part acknowledged to be a consequence of budgetary constraints by MoFA, particularly in visiting farmers within a large spatial disbursement of islands, and also due to a lack of inherent technical capacity (MoFA, 2010).

The agricultural research capabilities in the Maldives were further noted to be lacking with limited adaptive and applied research capacity at both research centres located on the islands of Gan and Hanimaadhoo (MoFA, 2010). IFAD (2006) further highlighted the poor national sampling surveys conducted by the research centres where only small parts of the country were visited, again due to budgetary constraints in visiting widely dispersed farming islands. Despite these shortfalls, MoFA (2010) noted that adaptive trials of exotic and indigenous cultivars had taken place along with a breeding improvement programme for

local poultry. They further noted that the research centres remained the main teaching venue in the Maldives for agricultural students (ibid).

Data collection and analysis were noted by Naik et al. (2012) to be at the core of long term planning for sustainable agriculture, as they enabled an accurate presentation of agricultural trends, and suggested reasons as to why the trends had developed. However, ADB (2005) noted that due to the constraints in its collection and lack of analytical capacity, data collection and analysis in the Maldives demonstrated a general direction rather than an evidence based trend. In rectifying this situation, MoFA have attempted to train staff in data collection and analysis with some progress being made in capturing productive output.

Disease and pest control were mainly under the control of the limited extension services of MoFA. MoFA (2010) reported on the increasing incidence of pest intrusion in the Maldives such as rhinoceros and hispine beetle in coconut plants, and white fly in vegetables. Pest intrusion was attributed in part to the importation of invasive species from inorganic manure, and a lack of integrated pest management employed in the wake of expanded agricultural production (ibid). According to FAO (2012a) and (Liebregts, 2007), attempts by MoFA to raise farmer awareness of the benefits of integrated pest management were disappointing as farmers perceived that quick fix solutions from often hazardous pesticides[14] were more effective. Further efforts by MoFA to educate farmers in conservation agriculture promoting no tillage, intercropping, crop cover, and agro forestry, were similarly met by a disappointing uptake from farmers (Wittig, 2012).

Assisting efforts to control the importation and use of harmful pathogens, species, and hazardous chemicals, were legislation and regulation in the form of the Plant Protection Act 12/2011, the Draft Pesticide Bill 2010, the National Chemical Committee, and the Plant and Animal Quarantine Centre based at the main airport (MoFA, 2010). However, the *Maldives National Chemical Profile* of 2015 noted: "The chemical pollution emissions from the agricultural sector in the country are currently unmonitored" (Ministry of Environment and Energy, 2015, p.23) and reported that, in some instances, had reached alarming levels. FAO (2012a) added that MoFA lacked enforcement capabilities to control hazardous agricultural pollutants. Despite this worrying threat to environmental conservation, MoFA continues through its own offices and in collaboration with its donors and supporting Maldivian

[14] Within the term pesticides, the following is included: fungicides, herbicides, insecticides and rodenticides.

institutions, to build the technical capacity of its staff in raising farmers' awareness to the impacts of agricultural pollution.

While not a government institution, the intersection of the private sector with Maldivian agriculture has the potential to provide a range of benefits to the development of agriculture in the form of investment, technical expertise, and access to markets. Yet despite this potential stimulus for the sector, FAO (2012a) reported that the private sector only has small investments in agriculture due to its historically low returns and challenges in production: "At present imported fresh and processed products are cheaper than domestically produced ones and this has posed as a major disincentive for entrepreneurs to enter into agribusiness" (p.12). FAO (2012a) further contended that local production costs needed to be reduced by utilising appropriate technology in order to make investment in agriculture by the private sector a more attractive proposition.

Within the realm of private sector investment in agriculture, were corporate social responsibility programmes practiced by some tourist resorts. This involved providing financial support to neighbouring communities in the production of high value niche items such as lettuce and sweet melons, which resorts would then buy back from farmers (IFAD, 2008). Although not widely practiced in the Maldives, farmers who participated in corporate social responsibility schemes noted that their interaction with resorts could reap benefits in terms of familiarisation with tourist market food requirements and related commercial opportunities (ibid).

## 2.5. Environmental considerations.

The World Bank (2007) in the *World Development Report 2008: Agriculture for Development*, stated that the sustainable use of natural resources was necessary for agricultural development: "The agriculture for development agenda will not succeed without more sustainable use of natural resources—water, forests, soil conservation…and other ecosystem services" (p.199). The same report further noted the environmental shadow of agriculture looming large over many countries, as agriculture was the major consumer of land and water, and a polluter of ecosystems and biodiversity. Conversely, the World Bank report (2007) also noted that agriculture itself was a victim of global phenomena such as climate change. This section examined some of the environmental considerations that intersected with agriculture within the scope of this research.

**Land availability**

**Developing countries:** At the core of sustainable agriculture was the availability and utilisation of natural resources such as land and water (Pretty, 2008). Bruinsma (2009) contended that according to the *2002 Global Agro Ecological Zone Study*, there was an estimated 1.8 billion ha of available agricultural land for cultivating rain fed crops in developing countries. In Young's article, *Is there really spare land? A critique of estimates of available cultivable land in developing countries*, Young posited that if such vast areas of available land were present, it would have been already utilised to feed expanding populations in the developing world (Young, 1999).

Hurst et al. (2005b) noted that the main factors affecting agricultural land availability in developing countries were: urban settlement expansion fuelled by rising incomes and rural migration particularly in the emerging economies of SE Asia and South America; increased industrialisation where modernised infrastructure supported extractive and manufacturing industry; commercial investment that often monopolised the purchases of large tracts of land as in the case of the 2008 Ethiopian land grab (Horne & Mousseau, 2011) (Cotula et al., 2010); biofuel production where significant quantities of maize and oilseed rape were sequestered to ethanol and biodiesel production (Rosegrant, 2008); land fragmentation where farming plot sizes could be reduced due to inheritance laws based on paternal wishes, the diversity of land quality, and inadequate market mechanisms for the sale and purchase of land (Niroula & Thapa, 2005); and, land degradation where wind and water erosion, coastal erosion, desertification, nutrient depletion, water scarcity, and, chemical pollution could remove up to five million ha. of agricultural land per annum (Young, 1994).

**SIDS:** The UNFCCC (2005) noted that land to sea area ratio's in SIDS were skewed in favour of the sea territories, with many SIDS possessing significant oceanic territorial boundaries and exclusive economic zones (EEZ). In the case of the Maldives, the land area is 300 $km^2$, the water area including territorial water is approximately 90,000 $km^2$, and the EEZ is 859,000 $km^2$ (FAO, 2017). In view of the small land sizes of most SIDS, Becker (2012) contended that SIDS "typically have very little fertile or arable land available for cultivation" (p.11). Briguglio (1995) added that even where there was agricultural land available, coastal erosion and sea level rise reduced its area and availability. Table 4 provides an indication of arable and non-arable land holdings per capita of population for selected SIDS.

**Table 4. Arable and non-arable land holdings in selected SIDS. 2009.**

| Country | Total land mass $km^2$ | Non-arable land $km^2$ | Arable land $km^2$ | Arable land $m^2$ per capita |
|---|---|---|---|---|
| Grenada | 340 | 320 | 20 | 191 |
| Kiribati | 810 | 790 | 20 | 201 |
| Maldives | 300 | 260 | 40 | 127 |
| Marshall Islands | 180 | 160 | 20 | 370 |
| Sao Tome and Principe | 960 | 860 | 100 | 605 |
| Seychelles | 460 | 450 | 10 | 116 |
| St Kits and Nevis | 260 | 220 | 40 | 763 |
| Tonga | 720 | 560 | 160 | 1538 |
| Tuvalu | 30 | 30 | 0 | 0 |
| Vanuatu | 12,190 | 11,990 | 200 | 835 |

*Source: Becker, 2012.*

The relative scarcity of arable land holdings in SIDS heightened the awareness over agricultural land planning where mapping, zoning, allocation and usage had sometimes utilised technological assistance from the United Nations Initiative on Global Geospatial Information Management**,** and the Global Land Tool Network (Fédération Internationale des Géomètres (FIG), 2013a). In approaching land planning in this way, Beck (2008) contended that: "Access to these technologies will assist small island and coastal low-lying states in enhancing food security, agricultural production and rural livelihoods by guiding the most suitable agricultural land uses on the most productive lands." (p. 2).

Urbanisation was noted as a threat to available farming land in developing countries, and was similarly noted to also be the case in SIDS by the United Nations Office of the High Representative for Least Developed Countries as rural populations migrated to towns and cities in search of employment, education, and health services (UN-OHRLLS, 2013). Beck (2008) further articulated concern over growing urbanisation when he noted: "As our urban areas grow, and available land is diminished, we are also losing the ability to produce our traditional food sources" (p. 2). In terms of land fragmentation, Poonyth and Ford (2005) contended that as communal farming practices had given way to more individualistic farming approaches, there had been increased conflict and division in communities over the use of land. As a result, previously farmed communal land had been divided to accommodate individual usage as part of conflict resolution process which had often resulted in reduced productive output.

**Maldives:** The *Maldives Country Programming Framework 2013-17,* identified the shortage of agricultural land when it noted: "There is a definite shortage of arable terrain, coupled with issues of appropriate land allocation, utilization and land tenure systems in both inhabited and uninhabited islands" (FAO, 2012a, p.11). In discussing what agricultural land was available in the Maldives, the Ministry of Planning and National Development (2003) noted that of the 2,781 ha. of cultivable land, 1,793 ha. was located on inhabited islands, and 988 ha. on uninhabited islands. See Appendix 4. This figure was revised in 2010 as the 2010 *Agricultural Development Master Plan Maldives 2010-2025* (MoFA, 2010) noted that of the 2,670 ha. of cultivable land, 1770 ha. were situated on inhabited islands, and 900 ha. on uninhabited islands[15]. The Master Plan further noted that most of the cultivable land on inhabited islands was farmed as household plots between 100–200 $m^2$, and field plots of 100 $m^2$ to 1,000 $m^2$ (MoFA, 2010).

The depletion of available agricultural land in the Maldives was noted as being caused mainly by an expanding tourist sector, and coastal erosion. In the case of tourism, the *Maldives Economic Diversification Strategy 2013* noted that communities of sparsely inhabited islands were being encouraged to relocate to more populated islands where improved access to infrastructure and services would be available (Ministry of Economic Development, 2013). This would allow the vacated island to be redeveloped for tourism, and at the same time would result in the depletion of farming land that had been attached to the departing community. Faisal (2008) commented upon the depopulation process when he noted that spatial development in the Maldives was characterised by "the relative depopulation of already small populations on some islands and over urbanization of the capital Male" (p.3).

Shaig (2006) reported that 97% of islands in the Maldives suffered from coastal erosion in 2004, with 64% suffering severe erosion. Despite a lack of data on how coastal erosion has impacted upon the size of cultivable land holdings, MoFA (2010) posited that coastal erosion was expected to deplete farming land in two ways: (i) coastal protection defences in the form of barrier vegetation would be eroded thus exposing productive land to further erosion and saltwater inundation; and, (ii) coastal settlements would have to be relocated to alternative parts of the island where agriculture may be present. Shaig (2006) highlighted the significance of point (ii) when he reported that 47% of all housing structures on the

[15] The Agricultural Development Master Plan 2010-2025 questions the accuracy of this data noting that the recording methods are unreliable.

islands were within one hundred metres of the coastline, making them vulnerable to the forces of erosion.

In mitigating the impact of coastal erosion in the Maldives, Readshaw (1994) noted that crude coastal protection measures in the form of sea breaks and walls could have a negative environmental impact causing shore currents and natural sediment compositions to change. The Ministry of Housing, Transport and Environment, acknowledged the knowledge deficit on coastline defence amongst island communities, and suggested the introduction of appropriate erosion engineering such as sandbagging (Ministry of Housing Transport and Environment, 2009), while MoFA (2010) advocated the reinstatement of coastline vegetation and forestry to mitigate sediment flow.

MoFA (2010) further contended that the implementation of technological advances through greenhouse and hydroponic systems could reduce the resource requirement for agriculture where intensive cultivation would reduce the extent to which land, water, and soil were required. This contention was supported by UNDP where eight island community organisations received greenhouses with hydroponic systems under the Support to Integrated Farming project (UNDP, 2013). Unfortunately, most to these greenhouses are now dysfunctional and abandoned.

**Land Stewardship**

Matson et al. (1997) and the World Bank (2007) contended that the agricultural intensification of the 20th century provided unanticipated environmental barriers through chemical supplementations to land crops and pasture, and by the overgrazing of pastureland. Their negative environmental effects went largely unrecognised until the seventies, when resource degradation of land, soil, and water, and in some cases, the emergence of human illness, generated considerable concern particularly in developing countries (Pimentel, 1996).

**Developing countries:** Biodiversity. Plimentel (1996) and Conway (1998) noted that the indiscriminate usage of chemical pesticides over long periods of time, had rendered them less effective in controlling pest and disease challenges, and had negatively impacted upon biodiversity where many natural predators of pests resided. Pretty and Koohafkan (2002) also commented on the paradox of destroying natural predators of pests with pesticides when they noted that large tracts of land in the rainforests of Latin America and equatorial Africa had seen chemical pesticides destroy many valuable species of plants, insects, and

animals that were part of an ecosystem controlling pests and fertilising the soil. Steinfeld, Gerber, et al. (2006) further observed that overgrazing of pastureland had also had a negative effect on bio-diversity as the ecological balance with pasturage was disturbed. Similarly, Sedjo and Sohngen (2012) contended that ecological disturbances were evident with the encroachment of pastureland into forest peripheries.

Pasture. Whilst common to many developing countries, but less so to SIDS and the Maldives, was the expansion of livestock production during the livestock revolution which saw the overgrazing of pasture, rangeland, and forestry in many developing countries (Steinfeld, Gerber, et al., 2006). Steinfeld, Gerber, et al. (2006) further noted that this was mainly due to herd expansion, rather than herd intensification where more livestock occupied more land, as opposed to more livestock being housed in intensive rearing and growing systems occupying smaller land areas. Steinfeld, Gerber, et al. (2006) also contended that overgrazing negatively impacted upon soil quality where pasture and rangeland did not receive balanced nutritive supplementation. The increased competition for water and natural forage were also cited as symptoms of overgrazing pasture and rangeland (Steinfeld, Wassenaar, et al., 2006).

Water. FAO (1996) contended that most agricultural land in developing countries was dependent upon water from rainfall through which rivers, lakes, and ground water aquifers could be replenished. Conca (2006), however, noted that fierce competition for water from urbanisation, industrialisation, agricultural expansion and intensification, were evident. Ward et al. (2006) noted that the competition for water had resulted in its gradual depletion across many developing countries such as in India where groundwater levels had been depleted by approximately eighteen cubic metres per year over the last ten years. Luquet et al. (2005) suggested that the depletion of water levels was in part due to agricultural intensification and expansion where increased evapotranspiration[16] during crop growing had taken place. Steinfeld et al. (2006) added that the expansion and intensification of livestock production had also required more water both in its rangeland location, and in its controlled rearing and growing environment.

Juxtaposed with waters increased usage had been its misuse. In many cases water had been inefficiently managed through poor rain harvesting methods, inadequate storage facilities, and inefficient distributional capacity (UNDP, 2006). This had often been exacerbated by

[16] Evapotranspiration occurs where there is a loss of water from the soil both through evaporation and transpiration from growing plants

inappropriate technologies and training in capturing and storing water, and by policies that had subsidised electricity allowing for the inexpensive operation of electrical pumps for irrigation (Rockström et al., 2007). Pretty et al. (2003) noted that in South Asia, where 80% of water resources were used for agriculture, inappropriate technologies resulted in significant quantities of wasted water.

The mismanagement of water was also evident in coastal areas of many developing countries with its over extraction from freshwater aquifers leading to depletion and increased salinization from saltwater leaching (World Bank, 2007). Finney (2010) posited that tidal surges flooding low lying coastal farmland was an added cause of water salinization, and Tanji and Wallender (2011) observed that waterlogged soils leave salt residues after evaporation, which seeps into water tables with new rainfall. Tanji (1996) noted that the effects of salinization could have devastating effects as salt intolerant crop yields fall until a normalisation in water salinity can take place.

The increased use of fertiliser provided a further environmental concern to water supply through eutrophication where the runoff of nitrates and phosphate from fertiliser enrich algae and sea grass in rivers, lakes, lagoons, and coastal waters (Wittig, 2011). This has the effect of reducing water clarity and threatening the health of the waterway ecosystem (ibid). Conway (2012) contended that although the correlation between unabsorbed nitrogen in agriculture, and excessive nitrate levels in water tables was unclear, there may be an increased risk of nitrate contaminating drinking water from wells as they were not sufficiently monitored for nitrate seepage. Liebregts (2007) noted that the contamination of water tables could also take place from the seepage of pesticides, although in the Maldives he noted that their harmful effect was more commonly associated with direct contact during application and residues on produce.

Soil. Conway (2012) observed that a significant factor contributing to agricultural sustainability is soil management where a productive soil has to be managed and cared for in order to maintain the optimum balance of organic matter and mixed sized mineral particles[17]. He further noted that this management could be threatened by nutrient leaching from flooding and excessive irrigation so necessitating the need for nutrient replacement through organic or inorganic fertilisers: “Without nutrient replacement there is no agricultural sustainability” (p.248). Glaeser (2010) observed that nitrogen fertiliser emerged

[17] Within the particles there are nutrients such as potassium, nitrogen, phosphorous, and micronutrients such as manganese and zinc.

as the input of choice for many farmers during the Green Revolution as it increased productivity and was usually available and relatively inexpensive. He further contended that nitrogen fertiliser was often preferred over naturally sourced nitrogen found in composted plant and animal waste, or in nitrogen fixing plants. However, Sutton et al. (2012) noted that the overuse of nitrogen fertiliser resulted in high levels on non-absorption into soils and thus considerable wastage. They noted that in 2005 only seventeen metric tonnes of the one hundred metric tonnes of industrially produced nitrogen was absorbed by crops with the balance being wasted.

**SIDS:** Pesticide and fertiliser pollution. Agricultural pollutants and their effects on water, soil, biodiversity, and ecosystems of SIDS appeared similar to those encountered in developing countries, with the overuse of inorganic fertilisers and chemical pesticides resulting in natural resource degradation. Van der Velde et al (2006) noted that during the nineties, the importation and use of fertilisers for the intensive production of squash in Tongatapu jumped from approximately 5 kg ha., to 80 kg ha, and the use of pesticides and herbicides for controlling aphids and mildew also increased significantly. However, they added that despite traces of agricultural pesticide being present in groundwater, and water eutrophication from suspected nitrate runoff being evident in lagoons, there was no conclusive linkage to their cause being from agriculture.

The threat to terrestrial ecosystems and biodiversity from agriculture had increased significantly as agriculture developed in SIDS (FAO, 2004). FAO (2004) noted that the threat to endemic species as a result of disturbances during land clearing and cultivation, particularly in forest areas, had caused a significant strain on their conservation. They further noted that the increase in imported fresh food produce, plants, and agricultural inputs such as organic fertilizer, had increased the prevalence of invasive species and harmful pathogens which could increase the susceptibility of natural habitats to biological attacks, and could harm human health.

**Maldives:** Water. In the absence of rivers and streams in the Maldives[18], most crops were rain fed by the south west Hulhanga monsoon from June to August, and the North East dry Iruvai monsoon from November to April (ADB, 2005). In discussing rainfall in small island

[18] There are a few naturally occurring lakes and mangrove on the larger islands comprising brackish water that is unsuitable for irrigation other than those crops with high saltwater tolerance.

states, Pernetta (1992) noted that rainwater was constrained in its collection by the small land areas upon which it falls. This was certainly the case in the Maldives!

Of the rainfall harvesting that took place, most was collected from rooftops and stored in UPVC tanks or polyurethane lined pools acting as small reservoirs. Households would draw from this reserve in the first instance with the balance being used to irrigate household plots or farm plots within close proximity (MoFA, 2010). Crops were further supplied with freshwater from rain fed aquifers where mechanical pumps would extract the water from wells for use in irrigation[19]. Non mechanised wells using a bucket and line were also a common feature in supplying household gardens and small field plots with freshwater (FAO, 2005).

MOFA (2010) recorded that increased salinity of freshwater aquifers had taken place over the last ten years resulting in reduced growing conditions for low salt tolerance crops with deep root beds such as mango and breadfruit tress. Shaig (2006) contended that coastal flooding from greater frequency and intensity of storm surges had caused much of this increased saltwater inundation of aquifers. The extent of saltwater inundation of freshwater aquifers in the Maldives is unknown, however, there were some examples of increasing water salinity reported by farmers such as in the case of Baarah island in 2011 when the island experienced drought conditions (MoFA, 2010). Finney (2010) posited that saltwater inundation could take place in drought conditions as freshwater aquifers became depleted and were replenished by saltwater.

Awareness of the diminishing sustainability of freshwater usage in agriculture had caused some institutional concern within MoFA and with some farmers whom questioned water shortages during dry periods. In response to this concern, projects such as the Low Emission Climate Resilient Development programme had attempted to promote conservation agriculture where drip irrigation and water retention material around plants reduced water intake (UNDP Maldives, 2016). Similar technological advances were trialled by UNDP Maldives through the Support to Integrated Farming project which advocated greenhouse production utilising hydroponic feeding systems (UNDP, 2013). While interest is still evident in such water saving solutions, it is unclear the extent to which they are being used by farmers. This could in part be due to the belief that existing reserves are sufficient for

[19] The aquifer was a freshwater lens floating on brackish/saline groundwater. The extraction of water from aquifers was usually undertaken by digging wells or ditches between one and two metres deep thus allowing freshwater to seep into the excavated area and be pumped or lifted out in buckets.

subsistence and semi subsistent farming, and the added belief that commercial agriculture would draw on extensive rainwater harvesting and desalination plants for its water requirement.

Soil. The soil on Maldivian islands is of a generally poor quality with limited water retention capacity, a high calciferous content, and a paucity of nutrient composition[20] (Butany, 1974). Butany (1974) further noted that some of the larger islands, such as Kelaa in the north, and Foamulak in the south had natural depressions where rainwater and vegetative waste had collected to form a more fertile soil mix. Khaleel and Saeed (1996) contended that the composting of vegetative and fish waste could assist in building the soils nutrient content. Similarly, MoFA (2010) noted that conservation agriculture promoting no tillage, intercropping, crop cover, and agro forestry aiding would also benefit soil quality.

Despite these efforts at building soil capacity, the current practices of widespread burning of foliage and the dumping of waste inhibited soil nutrient rejuvenation (Khaleel and Saeed, 1996). The *Third National Environmental Action Plan 2009-2013* (Ministry of Housing Transport and Environment, 2009a), further commented upon the increasing practice of dumped waste where dump sites occupied land that could otherwise be utilised for agriculture. They added that the waste sometimes acted as a source of hazardous material seepage into the soil. MoFA further noted that their efforts to educate farmers in conservation agriculture promoting no tillage, intercropping, crop cover and so forth were similarly met by a disappointing uptake from farmers (Wittig, 2012).

Biodiversity and ecosystems. The *Fourth National Report to the Convention on Biological Diversity Maldives 2010* contended that terrestrial biodiversity supported limited flora and fauna of which palm trees *(Cocus nucifera)* were the most prolific, followed by approximately 580 species of plants and trees (Shareef, 2010). Small littoral forests, mainly of jungle type vegetation and mangroves and swamps were also evident on Maldivian islands which supported a variety of birds, fruit bats, and insects (ibid).

*The Agricultural Development Master Plan 2010 – 2025* (MoFA, 2010) contended that the biodiversity of marine and terrestrial ecosystems of the Maldives were under threat from the increasing modification of land use for expanded settlements and resort development,

[20] The soils consisted of a top layer (20-40 cm thick) comprising the calcareous materials of reef limestone, corals, molluscs and shells mixed with decayed vegetative waste. Below there was a hardpan level (av. 30 cm thick) mainly consisting of reef limestone. Soil PH levels were very high (average 8.5) due to excess calcium, and they were generally deficient in nitrogen and potassium resulting in a poor nutritive content (Liebregts, 2007).

and from the indiscriminate use of chemical pesticides and synthetic fertilisers where clear contraventions to the Environmental Protection and Preservation Act of Maldives (Law no. 4/93) were evident (FAOLEX Database, 2018). The Master Plan noted further threats to ecosystems from poor waste management and factors associated with climate change such as increased frequency and severity of storms. Despite the advocacy of increased public awareness to these threats in the *National Biodiversity Strategy and Action Plan 2002,* Shareef (2010) noted that limited technical and budgetary capacity had resulted in many of the threats remaining at large.

**Climate change**

Raleigh et al. (2008) posited that the developing world would bear the brunt of climate change impacts and costs as rising temperatures and increased variations in precipitation result in significant shifts in land use, population settlement, and human health. FAO (2014) noted that agriculture would be significantly affected by climate change impacts as the availability and accessibility to natural resources, and the shifting seasonality of weather patterns, would determine the growing cycles of the future.

**Developing countries:** Global warming. Houghton's (1997) *Global warming: the complete briefing* links greenhouse gas emissions to global warming and climate change. Houghton (1997) contended that the growth in emissions from carbon dioxide, nitrous oxide, and methane, formed an atmospheric barrier covering large parts of the earth's surface. This hindered the return to space of increasing amounts of infrared radiation, and the earth's land and oceans then became warmer increasing the likelihood of melting glaciers and polar ice caps. Houghton (1997) further posited that such changes would create more intense and frequent regional weather variations where extreme phenomena could emerge causing flooding and drought.

In developing countries, FAO (2014) posited that the changes in weather patterns were likely to see significant reductions in rainfall in mid and lower latitudes where dry and arid conditions already challenged farming. Correspondingly, they noted a rise in rainfall in higher latitudes over a short period of time. Evaporation levels were also expected to increase with higher temperatures, as were evapotranspiration rates in the growing of plants (ibid). Smith et al. (2008) contended that rising temperatures and decreasing precipitation would result in declining production yields where a 2-4$^{o}$C rise in temperature would see yields of cereals drop by 5-10%. The prediction by Smith et al. (2008) was set against the Intergovernmental Panel on Climate Change warning that the warming trend

was likely to continue with the possibility of global mean temperatures increasing between 1.4 and 5.8$^{o}$C by 2100 (McCarthy et al., 2001).

Greenhouse gas emissions. Agriculture was both a contributor to greenhouse gases, and a pathway to their reduction. As a contributor, the Intergovernmental Panel on Climate Change estimated that in 2005, direct agricultural greenhouse gas emissions from crop and animal husbandry accounted for up to 6.1 gigatonnes of carbon dioxide equivalent[21] per year or 12% of annual total emissions (Smith et al., 2008). Of this figure, methane was the highest contributor at 3.3 gigatonnes of the carbon dioxide equivalent mainly from the digestive process of ruminants, and from the anaerobic soils of rice paddies and marshy lands. Nitrous oxide was the second main contributor at 2.8 gigatonnes from nitrogen fertilisers, and carbon dioxide at 0.04 gigatonnes from vegetative decay (Bellarby et al., 2008; Garnett, 2011). Smith et al (2008) and Le Quéré (2010), added that indirect agricultural processes such as food processing and feed production would see total greenhouse gas emissions from agriculture rise to 15-30% in the coming years.

Carbon sequestration. Smith et al (2008) posited that carbon could be sequestered from the air for storage in the soil through forests, grasslands, and adaptive farming practices such as those used in conservation farming. Adaptive farming practices included composted vegetative waste, crop cover, no tillage, and agro forestry. In this way, the soil acted as a carbon sink in which carbon storage could be stable and long term (ibid). Lal (2004) estimated that the soil already holds in excess of 2,500 gigatonnes of carbon, of which half was located within forested areas. Lal (2004) went on to note that as more carbon was stored in the soil, so its structure, nutrient content, and fertility increased, although Conway (2012) noted that the impact of carbon fertilization upon increased crop yields was as yet inconclusive.

The World Bank (2012) posited that farmers in developing countries could be incentivised towards carbon capture farming practices through carbon trading schemes where emissions were monetised and traded. They posited that this could result in the polluting burdens of developed countries transforming into developing country benefits of which farmers could be a part.

**SIDS and Maldives:** In 2005, the United Nations Framework Convention on Climate Change noted that SIDS contributed least to climate change but were most likely to suffer its effects

[21] The carbon dioxide equivalent per year was defined as a combination of carbon dioxide, nitrous oxide, and methane.

(UNFCCC, 2005). The Convention added that SIDS environmental vulnerability in buffering against such effects as sea level rise, storm and tidal surges, changing weather patterns, and the salinization of soils, was constrained by their limited available resources. FAO (2014) posited that sea level rise had considerable ramifications for both irrigated and rain fed agriculture located in low lying coastal belts and deltas where flooding through higher tides would occur. FAO also commented on the debilitating effect of more frequent and extreme storm surges damaging irrigation equipment and decimating crops through flattening, flooding and saltwater inundation.

Sea level rise. Commenting on the Copenhagen Diagnosis[22], Allison et al. (2009) noted that sea levels were continuing to rise at faster rates than originally predicted. They further noted that predictions for 2100 increased from fifty-nine centimetres to one metre. In view of this and other corresponding predictions, the Maldives, which Woodroffe (2008) noted only had an average elevation of 1.5 metres above sea level, was placed atop the World Bank's 2009 list of countries to be affected by sea level rise (IRIN Global News, 2009).

The threat of a rise in sea level had come to embody the Maldives' climate change challenge as far back as 1987 when tidal surges flooded the capital of Male' causing extensive and costly damage (Khan et al., 2002). The GoM voiced its concern over the country's potential vulnerability to sea level rise at the 1992 United Nations Conference on Environment and Development when President Abdul Gayoom stated: *"*I stand before you as a representative of an endangered people. We are told that as a result of global warming and sea-level rise, my country, the Maldives, may sometime during the next century, disappear from the face of the Earth." (Gayoom, 1992).

In spite of its extreme vulnerability to sea level rise, the literature offered conflicting views concerning the rate of sea level rise around the Maldives. Mörner (2004) posited that during the last twenty to thirty-five years, sea levels had reduced around the Maldives due to increased northeast monsoonal activity. Woodworth (2005) on the other, hand contended that there was little evidence from regional climatic indicators to suggest that a drop in sea level had occurred. In spite of conflicting views, Church et al. (2006) contended that the body of scientific opinion appeared to suggest that the Maldives reflected the regional [Indian Ocean] average rise in sea level of between 1.0 – 1.2 mm/year during the fifty year

[22] The Copenhagen Diagnosis was a peer review of climate change literature published in 2009.

period 1950 – 2001. Woodworth (2005) further posited that a rise sea level of 0.5 metres in the Maldives by 2100 should form the basis for future national climate resilience strategies.

Although rising sea level in the Maldives would typically suggest the immersion of large parts of low lying land as contended by Tol (2007), there was scientific conjecture stating that the process of progradation may minimise this impact. Progradation is where a combination of wave strength, ocean currents, and wind, could create sufficient sediment accumulation to be moved from one part of the island to another (Kench et al., 2003)[23]. In this way, there would be no depletion of land area but rather a repositioning of land area, with Kench positing that there could even be increases in land area.

Indicative of the impacts of sea level rise on Maldivian agriculture was the advent of the 2004 Tsunami which caused a loss of agricultural land and crops (ADB, 2005). The ADB (2005) estimated that there was US$11m in damage to the agricultural sector where 2,103 farms and 11,678 homesteads with backyard farm plots encountered crop and equipment damage. It was further noted that 700,000 fruit trees and 840,000 timber trees were also affected by flooding and saltwater inundation (ibid). ADB (2005) recorded that damage to land and groundwater resources was evident on 112 inhabited islands with severe saltwater inundation of land occurring on twenty-six inhabited agricultural islands.

MoFA (2010), (IFAD, 2010a), and FAO (2012a) all highlighted the benefits of adapting to a more climate smart agriculture in mitigating the effects of sea level rise, and indeed, the wider impacts of climate change. FAO and UNDP were particularly active in this area where they supported the Low Emission Climate Development agenda that aimed to build the resilience capacity of island communities in order to deal with disaster risk management. FAO noted that part of this strategy involved attempts to improve rural livelihoods through increased agricultural productivity utilising climate friendly approaches particularly in the areas of pest management and farm composting (FAO, 2016).

## 2.6. Sociocultural considerations

Numerous references to the sociocultural context in which agriculture should be framed within developing countries were evident in the literature. Indeed, IAASTD (2009), the World Bank (2007), Conway (2012), and Pretty (2008) all commented on the necessity of

[23] Kench (2003) contended that despite rises in sea level, the island may change shape rather than lose land area.

developing an appreciation of the sociocultural context in attempting to build sustainable capacity into agricultural practices. Further reference from the United Nations Agenda 21 referred to sociocultural considerations in discussing land use and the intrinsic worth of livestock to rural communities (United Nations Department for Economic and Social Affairs, 2004), whilst the World Bank (2007) discussed sociocultural differences in accessing economic opportunities for agriculture. In this section, the sociocultural context of farming experiences was examined with a view to understanding what meanings were derived from these experiences.

**Agriculture, health and nutrition.**

**Developing countries:** Toxic pollution harming human health. The World Banks', *World Development Report – Agriculture for Development 2008,* discussed the risks of agricultural pollution to human health when it noted: "During the past three decades, indiscriminate use of chemical pesticides in agriculture has created serious health and environmental problems in many developing countries" (p.1). The World Bank report, *Toxic Pollution from Agriculture: An Emerging Story* (2006) discussed the effects of toxic pollution on agricultural workers where an estimated 20,000 agricultural workers had died and an estimated five million had suffered illness[24] (World Bank, 2006). The report went onto highlight the need for sustainable safety practices in the handling and use of agricultural chemicals by identifying a sample of 890 smallholders in Bangladesh, of which 47% were found to overuse pesticides, and 87% used no protective measures in handling pesticides.

In combating the toxicity of agricultural pollution, national governments, civil society, international research institutes, and the donor community had promoted safer usage of toxic agricultural substances in conjunction with sustainable alternative natural controls such as integrated pest management (World Bank, 2006). The World Bank (2007) noted that further efforts towards sustainable practices were required in the coordination of health and agricultural initiatives to secure the welfare of agriculture workers.

Nutrition deficiency. Poor diets comprising excess processed fats, salt, and sugar, and the absence of fresh food containing proteins, fats, carbohydrates, and micronutrients were noted as causing undernourishment[25] in many developing countries by FAO in their report, *The State of Food Insecurity in the World 2015* (FAO et al., 2015). Black et al. (2008) further

[24] Estimated figures as the correlation between adverse toxicity from agricultural pollutants and agricultural worker fatality/illness were scant.

[25] Undernourishment means that a person is not able eat sufficient food to meet daily minimum dietary energy requirements over a one-year period.

noted the significance of child nutrition from conception to 1,000 days old where the indicators for stunting, wasting, and underweight, for children under the age of five years were increased in the absence of balanced diets. Whilst undernourishment and malnutrition both presented challenges to health, Allen (2003) contended that micronutrient malnutrition was the greater global problem with Black et al. (2008) noting that in the worst cases this could cause up to 35% child mortality in low and middle-income countries for children under five years old. In addressing micronutrient malnutrition, Allen (2003) recommended that nutritionists, agriculturists, and development practitioners needed to share expertise in providing a variety of nutritional foods that were accessible to the most vulnerable people.

**SIDS and Maldives:** Toxic pollution harming human health. The literature linking agricultural pollution to poor health in SIDS was sparse, with this subject not widely commented upon in conclusive terms, but rather framed within realms of possibility. Despite the paucity of definitive linkages, FAO (2004) noted that where agricultural intensification utilizing significant quantities of synthetic fertilizers and chemical pesticides had taken place, there appeared more likelihood of pollution as toxic residues permeated water tables and soil content. Van der Velde et al. (2004) contended that in Tonga's squash production fields, nitrates in excess of five times the WHO safety limit were found in drinking water in addition to traces of pesticides. In spite of these and similar findings in other SIDS, the linkages between cause and effect remained unclear. In the Maldives, the *Agricultural Development Master Plan 2010-2025,* and the *Maldives Country Programming Framework (2013 – 2017)*, both cited the drafting of The Pesticides Bill 2010 as significant in controlling the entry and usage of toxic substances for agricultural use. However, this Bill has remained in its draft stage, and should it be enacted, the balance of its strength will reside in its enforcement capacity.

Nutrition deficiency. In commenting upon the nutritional status of SIDS, FAO (2004) noted that: "SIDS are facing clear deterioration in the nutrition situation…increasing the incidence of non-communicable diseases, along with prevalent child malnutrition, vitamin A deficiency and anaemia in women" (p.22). Both FAO (2004), and FAO / WHO (2010) acknowledged that many traditional foods such as fresh fruit and vegetables had been replaced with imported nutritionally deficient processed food which was exacerbating nutritional deficits in many SIDS.

The Maldivian Ministry of Health in *The National Micronutrient Survey 2007* posited that the main reason for nutritional disorder in the Maldives was food type consumption, and a lack of education regarding family nutrition (Ministry of Health, 2007). In addressing dietary preferences in the Maldives, Lubna (2012) noted that processed foods with enhanced flavourings, prolonged shelf life, shop availability, and household affordability were often preferred in supplementing the food staples of fish, rice and coconut. The *State of the World's Children Report 2009* noted that during the period 2000-2007 there remained nutritional disorders in the Maldivian diet with 25% of children under five years of age experiencing stunting, and 13% experiencing wasting (UNICEF, 2008). Of particular concern were micronutrient deficiencies such as iodine and vitamin A; in 2001 more than 5% of children under five years suffered from vitamin A deficiency. *The National Micronutrient Survey 2007* went on to say that increased educative efforts on balanced nutritional intake, particularly relating to the benefits of local food sources, were required in conjunction with improved access to dietary diversity for children under five years old and pregnant women (Ministry of Health, 2007).

In response to the reports of the Maldives' nutritional deficit, the Ministry of Health embarked upon the Integrated Early Childhood Development Programme from 2008 to 2010. The Programme consisted of behavioural science courses targeting five atolls, which looked at the following issues: exclusive breast feeding; full immunization; vitamin A dosage; growth monitoring; and, complementary feeding, (UNICEF, 2007). UNICEF (2007) reported that the results of the programme had been positive in reducing micronutrient deficiency in the target group. Plans for replicating the programme on a national level were to be considered.

While the topics of agriculture, health and nutrition are not always explicitly linkable, this research utilizes the existing literature to analyse the interdependent relationship between agricultural capacity building, sustainable agricultural practices, diet and nutrition, and healthy developmental trajectories of the Maldivian people.

**Farming modalities (family farming units, risk, exclusion, hierarchy, individualism, social cohesion, labour, cooperatives, stigmatisation, beliefs and magic).**

**Developing countries:** Family farming units. The World Bank (2007) contended that family farming units comprised the majority of agricultural output in the developing world. Within the family units, Feldstein and Poats (1989) contended that there were labour divisions between men and women where one may not automatically substitute for the other. This

invariably contributed to individualistic activity amongst the family members in performing specific functions. For example, women may perform most of the manual labouring whereas men would act as the main interlocutors with the factor and producer markets.

In their discussion on household farming in semi-arid tropics, Pearson et al. (1995) noted that farming households typically had the following five characteristics: (i) limited capital; (ii) reliance upon family members for labour; (iii) exposure to external influences such as community directives; (iv) communal sharing of produce and services between household's due to fledging linkages to the market; and, (v) part use of their produce for home consumption. In considering these characteristics, Singh et al. (1986) posited that family farming households were units that possessed both producer and consumer functions. Singh, Squire et al. (1986) further posited that the duality of producer and consumer functions required householders to make decisions on how the functions interacted between themselves, within the household and community, and in relation to government policies.

Risk associated with farming. Pearson et al. (1995) posited that decision making in households was determined by exogenous factors over which households had little control such as weather and cultural traditions, and endogenous factors over which households had more control such operational and organizational management. They further contended that risk was one of the most significant factors affecting decision making as farmers: "Wish to earn as much as possible with least effort and risk" (p.3). The World Bank (2007) contended that barriers to capacity building exist in that: "risk reducing instruments are severely lacking in rural areas" (p.89) and point to inclement weather and poor personal health as being regarded as significant risks to agricultural activity. In mitigating risk, the World Bank (2007) went on to say that collectivized approaches in production and marketing, and an enabling policy environment could assist in agricultural capacity building. However, they noted that it was not uncommon for many smallholders to be or feel excluded from such approaches and the policy environment.

Exclusion from farming. The World Bank (2007) noted that issues of exclusion typically affected women more than men and could be directed by cultural tradition through women's non-participation or partial participation in activities such as credit schemes, cooperative marketing structures, or learning opportunities. The World Bank (2007) stated: "exclusion from such networks can severely limit the choices of many, and the poorest are most likely to be excluded" (p.88). However, De Janvry and Sadoulet (2006), contended that

in many south Asian rural communities such as Bangladesh and India, women were included in leading roles within many agricultural structures by virtue of their participation in micro credit schemes. We then seen how gender and credit becomes an important facet in agricultural capacity building.

Hierarchy influencing farming. According to Joshi et al. (2017), cultural norms predicated on hierarchy were commonplace in many parts of Asia, particularly in India where 'scheduled' castes endured segregated living and work opportunities mainly as a result of entrenched client patron relationships. They contended that hierarchical power could be driven by such determinants as economic superiority, cultural norms and beliefs, and political control. In rural India, the scheduled castes were invariably found on the periphery of villages and were confined to subsistence agriculture by virtue of their inability to access factor and producer markets (ibid). Whilst legislation guaranteeing their representation in local government had been enacted in recent years, they remained excluded from many of the support services and markets that could assist in advancing their agricultural effort (ibid).

Individualism within farming. Bromley (1989) argued that gaps in community services prompted small farmers to compete in their interaction with producer and factor markets thus prompting more individualistic behaviour. In this way, Jodha (1990) contended that the controlling influence of community farming waned in favour of more individualistic approach. Pearson et al. (1995) further contended that expanding populations drove individualism as increased urbanization and industrialization diminished the isolation of rural communities where community services had previously been main providers. Pearson et al. (1995) discussed three main areas where individualism intersected with smallholders: (i) changing individualized power bases where the emergence of new patrons in village communities, such as agro dealers, may not subscribe to the traditional communal norms; (ii) individualized land holdings where land rights were increasingly monetized through rents, leases, and informal agreements thus contributing to diminishing communal land; and, (iii) individualized labour where traditional practices of communal assistance and reciprocity were replaced with waged labour.

**SIDS and Maldives:** Social cohesion. Ashoff (1989) and Streeten (1993) in Armstrong et al. (1998) posited that the smallness of SIDS encouraged "greater social homogeneity and cohesion" (p. 641), while Srebrnik (2004) noted that smallness and remoteness engendered community unification, as people realized it was easier to get along with each other than to maintain confrontational relationships. Lowenthal (1987) described this communality as a

"managed intimacy" (p.39) where negative feelings were often masked for the sake of social harmony.

FAO (2004) posited that "people centred development" (p.12) involving the participation and consultation of smallholders could create social cohesion, which in turn could contribute to building sustainable agriculture in SIDS. They suggested that the participatory approach was beneficial in blending traditional knowledge with modern farming practices and new institutional approaches to building agricultural sustainability (ibid). Conway (1998) elaborated on the importance of the participatory process at village and district level where group decisions could translate into policy affecting large numbers of small farmers.

In the Maldives, Maloney (1980) observed that its smallness and relative isolation indeed engendered community unification with everybody wanting to know what the other was doing. He posited that this was in part due to curiosity, but also part of a communal feeling that sought to overcome isolation and remoteness by sharing experiences. The anthropologist Romero-Frias (1999) elaborated on the idea of communality on Maldivian islands when he described it as an "idea of wholeness" (p.62), where factors such as love, jealousy, and disease, were inseparable from the islands' main activities of fishing, farming, and trading. He posited that island life was then derived from a connectedness between islanders and the whole of the islands' activities. This, he suggested, led to feelings of self-containment, but not always contentment, as internal occurrences that were associated with anything out of the ordinary could cause resentment and jealousy. In farming, jealousy could often arise as a result of particularly successful crops; sometimes malevolent action resulted in the form of crops being vandalised or stolen. It can then be seen that Maldivian social cohesion must be a factor in all sustainable agricultural and capacity building efforts.

Agricultural labour. IFAD (2006) noted that two thirds of the Maldivian population were engaged in subsistence and semi subsistence agriculture. The FAO *Maldives Country Programming Framework 2013-2017* contended that despite this level of involvement: "Labour shortage and the lack of skilled labour are an important impediment to sustainable agriculture" (p.11).

The World Bank noted that the Maldives had one of the lowest labour participation rates in South Asia with only 66% of the workforce (55% female, 76% male) being employed in

2010[26] (World Bank, 2011c). The Maldivian *Household Income and Expenditure Survey 2009-2010* further recorded the low level of youth participation in the workforce, with only 58% of males, and 52% of females between the ages of 15 – 24 years old being employed (DNP, 2012). The same survey also recorded that 1,654 males and 2,467 females were employed in the agriculture and forestry sector (Ibid). Within this employment data, there was no evidence that revealed the numbers of youth employed in agriculture, however, from this research it may be assumed that it was not significant. Despite this assumption, FAO noted: "the age distribution of the population actively engaged in farming on some of the islands is growing as younger people are joining the sector" (FAO, 2012a, p.11).

The reasons for the absence of many young Maldivians from the agricultural sector were not fully understood (MoFA, 2010). The Department of National Planning noted that discouraged labour[27] was a factor in low youth labour participation rates in general but did not comment upon agricultural participation (DNP, 2012). In attempting to address low youth participation rates in agriculture, MoFA programmes such as PTAFRP and FADiP targeted youth as part of the project beneficiaries believing that access to training, new technology, funding assistance, and, the potential to generate commercial returns, would provide sufficient incentive towards sustainable agricultural engagement (IFAD, 2008).

While the *Millennium Development Goals Maldives Country Report 2010* indicated that women tended to achieve greater gender parity in the urban centres, Fulu (2007) noted that women remained largely subordinate to men in most aspects of daily life, bound by traditional cultural practices and social norms, particularly on inhabited islands away from the urban centres. Despite constituting approximately 60% of the agricultural workforce, the *Maldives Country Programming Framework 2013-2017* noted: "Women have a very limited role in the management of farms and financial management" (FAO, 2012a, p.11). They continued that women provided manual labour in farming, while men assisted in specific tasks requiring physical strength, and acting as the main interlocutors with factor and producer markets. FAO (2012a) further reported challenges to women's traditional participation in agriculture from migrant labour assuming their labouring function. In this

[26] Labour force participation rate is the proportion of the population aged fifteen and older that is economically active, and who supply labour for the production of goods and services during a specified period (World Bank, 2013)

[27] The definition of unemployment in the Maldives included discouraged workers which were working age people who were not seeking employment either because they think there was no work available, or they considered it too difficult to migrate to work centres on other islands (DNP, 2012).

way agricultural capacity building appeared to be redirected away from women in the direction of migrant agricultural labour.

There was a paucity of literature on the role of migrant labour in Maldivian agriculture, other than cursory reference to its encroachment into women's traditional farming roles as previously mentioned. Despite this situation, the *Statistical Yearbook of Maldives 2012*, recorded that 520 expatriate labour from Bangladesh and India provided manual labour in the cultivation and harvesting of crops in 2010 (DNP, 2011). While this figure acknowledged the official presence of migrant agricultural labour, the figure was believed to be considerably higher as many undocumented workers found their way into the agricultural sector.

Cooperatives. IFAD, in its *Rural Poverty Report 2011,* commented on the importance of farming households intersecting with collective farming structures, such as cooperatives and farmer's associations, in order to access farming inputs, skills training, and markets for the sale of produce (IFAD, 2010). Mitchel and Coles (2011) elaborated on the theme of intersecting households and cooperatives when they noted it more likely for individual households to pursue producer functions such as cultivation and harvesting, which could then intersect with cooperatives for the marketing of produce; they also posited that cooperatives could be more effective in accessing value chains.

Commentators on Maldivian agriculture noted that inherent cooperative values were evident as expressed by Ellis[28] in Maloney (1980) when he commented upon the "cooperative principles" (p.180) of sharing farming duties. Butany (1974) further described the presence of cooperative stores for the sale of fish and purchase of household items as fixtures within island life. The latter-day reference to 'cooperative principles' in Maldivian agriculture was accompanied by present day policy and programmes for the formation of community based producer organizations and cooperatives, particularly through the PTAFRP and FADiP interventions (IFAD, 2008). Both interventions were designed to collectivise producer and marketing functions with the aim of expanding productive capacity in order to better connect with markets, particularly the tourist market (IFAD, 2008). However, both programmes encountered significant pushback from participants in their lack of contextual appreciation concerning the preference for individualistic farming activity, and

[28] Ellis, R. H. *A short account of the Laccadive Islands and Minicoy,* Madras Government Press, 1924.

community indifference to structures such as cooperatives whose brand of collectivism was not rooted within island life (IFAD, 2017).

Hierarchy. In the Maldives, Maloney (1980) observed a hierarchical caste structure that was controlled by a strict political framework. He noted that: "Social and political control is rigid at all levels" (p.175) and was expected by the people. In the seventies, the rigidity of the control appeared to be defused, as a class structure emerged based upon education, wealth, and exposure to experiences from the outside world (ibid). As Maloney (1980) noted, even the use of the English language could be a powerful tool in distinguishing class demarcation.

During the late seventies and early eighties, the modernization of the fishing industry and the development of the tourist sector bought the workings of the Maldivian polity into sharp focus as business interests fuelled by commercial returns from fishing and tourism competed in the country's increasing capitalist activity (Colton, 1995). The Maldivian polity was presided over by authoritarian rule with the patronage of a President at its apex, and was supported in its operation by economic interest from the emerging business community and an entrenched social elite (Colton, 1995; Ginsburg, 2013) . However, by 2006, there was considerable momentum for political change by new actors who realized that their education and wealth enabled them to demand political, social, and economic rights that were beyond the patronage of a President (Hadenius & Teorell, 2007). The new political actors wanted equitable development for all citizens, and an end to historical inequalities that had characterized the Maldives since the days of the Sultanate (ibid).

The potential impacts of politicisation upon the agricultural sector were unclear, however, IFAD's 2006 *Post Tsunami Agriculture and Fisheries Rehabilitation Programme* document referred to increasingly vocal political opposition as being of sufficient concern to impact upon its programme implementation. In 2017, IFAD further noted that the political upheaval in 2012 delayed the implementation of the PTAFRP to such an extent that the programmes redesign was necessary (IFAD, 2017). President Waheed[29], in a 2012 speech, further noted the inevitability of pollicisation of the civil service due to the small resource base from which to draw qualified people (Waheed, 2012). The civil service controlled the operation of government ministries of which the Ministry of Fisheries and Agriculture was one. President Waheed's sentiment appeared to reinforce Maloney's (1980) earlier sociocultural / socio-

[29] President Mohamed Waheed Dean succeeded President Mohamed Nasheed in 2012.

political observation that alluded to the political capture of island administrations favouring policies and programmes of an incumbent government.

Stigmatization of agriculture as a low-class activity. In his discussion on *People of the Maldive Islands,* Maloney (1980) observed: "Farming is not usually a full-time occupation, nor is it as respectable as fishing" (p. 287). He further observed farming could be done by anyone and was usually a stopgap during times of lean fishing or undertaken by those who are not good at fishing. As farming was more commonly undertaken by women, the stigmatisation of both women and farming appeared evident.

The Government of Maldives' *Strategic Action Plan 2009-2013* referred to the stigmatisation of traditional farming when referring to its public perception as a low class activity (GoM, 2009). ADB (2005) had previously commented that farming was undertaken by the aged, low-income families, women, or by small entrepreneurs employing migrant labour. In attempting to address the stigmatisation of farming, the Strategic Action Plan proposed greater emphasis on agricultural education, training, the introduction of innovative farming techniques, linkages to new markets, and, financial incentives to uplift the agricultural sector (GoM, 2009). In spite of this strategy, the youth of the rural island communities generally opted not to engage with agriculture, preferring to migrate to urban centres and tourist resorts in search of employment, or to remain unemployed (MoFA, 2010). Similarly, investment capacity today remains monopolised by the tourist sector (World Travel and Tourism Council, 2017). With a lack investment and the non-participation of youth in agriculture, there is cause for concern over agriculture's sustainability within Maldivian island life.

Beliefs and magic. Although acknowledged to be on the wane, *fandita,* a traditional good luck belief, was still performed during the growing of crops (Maloney, 1980). Maloney (1980) relayed an experience of a local farmer who is reported as saying: "I farm by *fandita* rather than by medicine" (p.258) referring to chemical supplements. *Fandita* in this instance was undertaken by placing not more than five rare fish or fish parts in the cultivated field. This was meant to protect against evil *Jinnis* (ghosts) harming the crops, and to aid high yields. Quite apart from its perceived spiritual value, the additive of fish parts was noted as being excellent in building the nutritive capacity of soil.

**Land rights and tenure**

**Developing countries:** Discussion on landlessness and land rights and tenure were much in evidence within the literature on building sustainable agricultural capacity in developing countries. The literature covered these subjects within their own right, and as crosscutting themes in terms of poverty alleviation, empowerment, and endowment (Agarwal, 1994; Platteau, 1996; Sen, 2000). Whilst the inclusion of this section maybe thought to be better positioned within the earlier commentary on land in *Environmental considerations,* the rights and tenure of land appeared to be more firmly rooted within sociocultural considerations than environmental concerns.

Landlessness. Conway (2012), and Mitchell and Coles (2011), posited that the rural poor were invariably landless or had farming plots that were too small to accommodate viable agriculture without the benefit of inputs. Conway (2012) continued that limited incomes curtailed the use of inputs resulting in land either being unproductive, left fallow, or given up to others who held the resources to farm. Sen (2000) discussed such actions in terms of social exclusion where farming families that did not have access to land may feel socially excluded from a community where land was widely held. He went on to say that the absence of family land may inhibit rural identity as families are removed from farming activity.

Land rights and tenure. Land rights were enshrined in Agenda 21 of the 1992 United Nations Conference on Environment and Development as being part of building sustainable agriculture. Whitehead and Tsikata (2003) discussed land rights in Sub Saharan Africa where they posited that clear and binding land tenure agreements could promote a greater sense of land stewardship as tenants attached priority to managing soils, water supplies, drainage and so forth, over a lengthy fixed tenancy.

Agarwal (1994) noted that the interpretation of land rights and tenure was often subject to customary traditions and cultural norms, which assumed priority over laws and regulations. He further noted that such considerations were commonly observed in terms of inheritance, purchase and sale transactions, and resource rights. FAO (2010) further observed that vulnerable groupings could be marginalized in customary interpretations of land rights as in times of dispute, where adequate political or economic representation was not available for them to draw upon. Of particular note in vulnerable groupings were women who held an estimated 20% of agricultural land in developing countries, often through the agreement of husbands or fathers (ibid). Whitehead and Tsikata (2003) noted that despite subordinated

land rights for women, successful challenges to customary land tenure practices were noted as McIntosh (1990) observed in Southern Africa where legislation promoting land equality had overridden chieftaincy rulings.

**SIDS and the Maldives:** Land rights and tenure. As in the case of developing countries, land rights through fair and equitable tenure were regarded as an integral part of building sustainable agricultural capacity in SIDS (Beck, 2008). In Pacific SIDS the 2013 Suva Statement on Spatially Responsible Governance noted that

> Rights to land as lying on a continuum where tenure can take a variety of forms and may overlap with one another, and the more appropriate form depends on the particular situation where customary right, for example, may be preferred in certain situations (Fédération Internationale des Géomètres, 2013. p.2)

Whilst acknowledging customary land rights, the Suva Statement also mentioned: "Improved governance of tenure of land" (p.2) as necessary in strengthening the institutional and legislative governance frameworks for agricultural land in SIDS. FAO (2004) observed that in land disputes the farmers' hand could be strengthened through the collective position of bodies such as cooperatives and farmer's associations. However, they acknowledged that the most realistic outlook for land rights and tenure was a balance between customary and legislative considerations.

In the Maldives, FAO (2012a) reported that land rights and tenure proved challenging to farmers where a lack of secure tenure was interspersed with a myriad of rental arrangements that seemed to differ between islands. According to the *Agricultural Development Master Plan 2010 – 2026* (MoFA, 2010), there were two ministries involved in the allocation of agricultural land depending on where it was located. The Ministry of Fisheries and Agriculture was responsible for the leasing of land on uninhabited islands for commercial agriculture purposes where lease agreements incorporated such terms as: purpose of use; lease timeframe; lease rental; vegetation and tree removal procedures; water rights, and so forth[30] (MoFA, 2010). The second form of lease was called a Varuvaa, which was an island lease with a nominal annual payment traditionally calculated on the number of coconut trees on the island requested (MoFA, 2010). This lease was more of an

[30] The standard time period for an agricultural lease was twenty one years with an option to renew to thirty five years if the investment exceeded US$10m (MoFA, 2010)

informal agreement where the lessees had no security of tenure and government could revoke the lease at any time for other projects such as tourist resorts (ibid).

The other arbiter of land in the Maldives was the Ministry of Home Affairs who managed land areas for agricultural usage on inhabited islands where island councils administered the land on their behalf (MoFA, 2010). These arrangements appeared island centric in that they varied between islands and were usually premised on availability with much of the land being given free of charge to applicant farmers (ibid).

The *Strategic Action Plan 2009-2013* (GoM, 2009) recognised the need for a standardised agricultural land allocation and a clear land governance process within the existing Maldivian Land Act 2002. MoFA (2010) contended that this would ensure a smoother passage for the allocation of agricultural land and contribute to incentives for participation in agriculture. Despite ongoing consultation, the allocation of agricultural land on inhabited islands remains in the gift of Island Councils according to tenurial arrangements of their making.

## 2.7. Chapter summary

The information flowing from the funnelled analysis of the literature suggested that while the Maldives had areas of commonality with developing countries and other SIDS in building sustainable agricultural capacity, some issues were brought into sharper focus when contrasted with the Maldivian literature. Of particular mention was the Maldivian sociocultural context of island farming, which favoured individualistic farming practices as opposed to collectivised farming activity found in cooperative structures as advocated by MoFA and its donor partners. Poor market connectivity for Maldivian farmers was also highlighted within the literature where access to factor and producer markets was sometimes hindered by a lack of farmers' knowledge of how the markets worked. This was of particular frustration to farmers and MoFA alike in trying to connect farmers to the lucrative tourist sector food market.

Knowledge gaps were of further concern to farmers especially relating to the misuse of chemical pesticides and synthetic fertilisers where many were simply unaware of correct application methods and the efficacy of the chemicals they were using. Farmers were also unaware of the ensuing linkages between agricultural pollution and the impacts of climate change on their farming. The literature noted that agricultural knowledge deficits were not confined to farmers but extended to MoFA's technical staff in conveying information to

farmers through extension services. Such deficits were attributed to budgetary constraints restricting technical training and visits to farming communities.

The intersection of farming stigmatisation with migrant agricultural labour and the absence of youth participation in agriculture was evident in the literature. The former attracted only a cursory mention belying its increasing significance in building sustainable productive capacity through assimilation into agricultural supply chains. Youths non-participation in agriculture was at the core of unsustainability concerns as its lack of presence drained capacity from the sector and threated agricultures future. Finally, there was little mention of agricultural profitability in the Maldivian literature despite it being the key motivation for people entering the agricultural sector.

The review of the literature established the context of the research and most noticeably revealed that MoFA was the main actor in providing agricultural capacity building interventions to farmers. Unfortunately, it appeared that this action was hindered by a lack of institutional capacity on the part of MoFA and a lack of agricultural capacity on the part of the farmers; this unsurprisingly led to many unsustainable programme interventions.

In ascertaining the veracity of the literatures commentary on Maldivian farming, the next chapter explains the methodology employed in collecting and analysing the data for this research.

# Chapter 3. Methodology

## 3.1. Chapter introduction

Chapter three explains the research design, and how the research was undertaken. The chapter was divided into nine sections, with the first section introducing the format of the chapter, and the second section explaining the philosophical perspective underpinning the research. The third section examines the research method, and the fourth section explains the data collection methods. The fifth section of the chapter comments on the data analysis, and the sixth on the validity, bias, and ethicality of the research. The seventh section looks at the researchers' position within the research, and section eight outlines the challenges in the research. Section nine provides a chapter summary.

The research methodology was trialled in a pilot study on the islands of Kendhikolhudhoo in Noonu Atoll, and Male' in Kaafu Atoll, during August and September 2013. From the pilot study, adjustments to the methodology were made prior to the commencement of the main data collection in 2014/15.

## 3.2. The philosophical perspective of this research

In his discussion on philosophical perspectives in qualitative research, Guba (1990) argued that a philosophical perspective was "a basic set of beliefs that guide action" (p.17). Creswell and Poth (2017) added that a philosophical perspective or worldview was: "A general orientation about the world, and the nature of research that a researcher holds" (p.6). Merriam (2009) further commented that the researcher's own ontological and epistemological views usually determined the philosophical perspective of qualitative research. The philosophical perspectives underpinning this research resided in interpretive constructivism and phenomenology.

**Interpretive constructivist:** The interpretive constructivist perspective assumed that there was no particular reality that provided specific recordable knowledge, but rather collections of realties around one event from which knowledge could be interpreted, derived, and socially constructed (Merriam, 2009). These characteristics are the hallmark of qualitative research where the researcher is interested in: "How people make sense of their world, and the experiences they have in their world" (Merriam, 2009, p.13). The interpretive constructivist philosophical perspective characterised my worldview and suited the

phenomenological line of enquiry I wished to pursue in eliciting Maldivian farming experiences and the meanings derived from these experiences.

**Phenomenology**: The philosophy of phenomenology[31] presented itself as a major contributor to the interpretive constructivist perspective as it enquired how we interpreted and constructed our experience of living (Patton, 2002). Patton (2002) noted that Edmund Husserl and Alfred Schutz presented phenomenology in the early part of the twentieth century as: "The study of how people describe things and experience them through their senses" (p.9). Patton (2002) noted that Husserl believed experiences were shaped by one's meanings and perceptions. In this research, I aim to find out the "lived experiences" (Van Menen, 1990, p.9) of Maldivian farmers where I wish to know how farmers interpret their experiences and frame their existence within their experiences. I wish to pursue this line of inquiry because I believe it will form solutions to challenges that are contextually relevant to Maldivian agriculture. In deriving meaning from the farmers' experiences, I hope to gain a holistic understanding of how Maldivian agriculture functions, and how farmers in the Maldives can build agricultural capacity through sustainable means.

This section has explained the philosophical perspective underpinning the research. The research methods are discussed in the next section.

## 3.3. Research method

This research was presented as a multisite case study that pursued a phenomenological line of inquiry in order to understand the experiences of farmers in the Maldives. Therefore, the case being studied was farmers in the Maldives. The case was bound within the island communities in which the farmers operated and included the farmers' experiences and those experiences of other agricultural stakeholders such as, MoFA, input suppliers, food customers, and donor institutions. The research method adopted was considered vigorous, robust, and original as it suited the task of eliciting the required information.

Analysis of the data in the multisite case study was through the reductive coding of the participants responses where themes were placed into categories from which ten codes emerged comprising forty-three subcodes. The ten codes were then reduced to six core codes which formed the basis of the six-point farming framework which answered the research question. For ease of reference to the reader, Chapter 7, *Discussion. Farmers in the*

[31] Phenomenology plays a significant role in the orientation of the Social Sciences, and as well as being a philosophy, is regarded as a type of qualitative research in its own right (Merriam, 2009).

*Maldives building capacity through sustainable means*, presents on overview of the ten codes from the three findings chapters in table 15. Following on, table 16 presents the six core codes to emerge which is accompanied by a discussion. Table 17 follows presenting the six-point farming framework accompanied by a discussion answering the main research question.

**Multisite case study:** Stake (2005) contended that a case study was the study of the case or unit itself, and Merriam (2009) referred to the case study as an: "In depth description and analysis of a bounded system" (p.43). Merriam (2009) elaborated that the bounded system defined the unit of research and provided a clear remit within which the research should remain. Stake (2005) noted that the multisite case study examined a collection of sites that were categorically linked to one another either through groupings or phenomenon. Miles and Huberman (1994) added that by examining a number of sites, the authenticity of the case study's findings was strengthened through a more robust generalizability. In terms of this research, data was analysed from fifty-one islands across fifteen atolls which provided for a strong generalised view of the Maldivian farmers' case. Appendix 5, *Islands visited during the fieldwork,* indicates the range of island types that were visited.

**Phenomenological inquiry:** Phenomenology, as part of the philosophical perspective underpinning this research was discussed in section *3.2. The philosophical perspective of this study*. Phenomenological inquiry lent itself to the research method as it elicited information from farmers, and those stakeholders who intersected with farmers, of experiences and the meanings derived from experiences. This type of inquiry went beyond conventional investigations into Maldivian farming activity as it dug deeper than the usual questionnaires and surveys in order to extract the glittering nuggets of farmers experiences. In doing this, participants responses ranged from richly descriptive narratives to blunt comment, all of which contributed to the overall essence of the Maldivian farming story.

**Methodological fit.** The methodological fit between the multisite case study and the phenomenological line of inquiry was appropriate for this research for four main reasons: (i) the flexibility of a multisite case study accommodated a phenomenological line of inquiry; (ii) the multisite case study lent itself to the investigation of context bound phenomenon where farmers were bound within the agricultural life of island communities; (iii) multiple sites accommodated the low concentration of highly dispersed agricultural activity making the study more representative of farming activity in the Maldives, and (iv) the reductive

coding used in the data analysis accurately conveyed the meaning of the farming experiences as relayed through the participant responses.

Collecting the data for the multisite case study is examined in the next section.

## 3.4. Data collection methods

Dey (2003) suggested that qualitative data was not simply lying around waiting to be collected but rather had to be gathered from wherever it resided. Patton (2002) added that far from data being a pre-determined source, it had to be gleaned from peoples: "Experiences, opinions, feelings and knowledge" (p.4). In gathering data, Merriam (2009) posited that human instruments were aptly suited for this task as they could act spontaneously in reaction to queries, clarifications, and difficult questions. The data collection instrument for this research was myself where I experienced a number of situations that required a spontaneous reaction on my part in order to address participants' queries.

In collecting data, I used purposeful sampling in selecting participants for the three data collection methods for this research. That is, semi-structured interviews; focus group discussions; and, field journal observations. Discussion on the use of purposeful sampling now follows.

**Purposeful sampling:** Purposeful sampling was a data collection tool used in the selection of participants for the three data collection methods used in this research. Purposeful sampling was further used for the selection of sites for the multisite case study, and in the selection of gatekeepers when entering island communities.

In their discussion on purposeful sampling, Chein (1981) posited that purposeful sampling aimed to obtain the widest range of views in relation to the unit of study. Patton (2002) added that those who were the most knowledgeable and had the most to tell about the subject should be selected as the sample. He continued that in choosing the sample, a set of selection criterion should be established relating to the nature of the research, and as importantly, what the research was hoping to find out from its participants (ibid). The criteria for the selection of the sites, gatekeepers, and participants follows in the next section.

Island site selection. Lincoln and Guba (1985) suggested that in order to obtain a wide range of views and avoid information saturation and repetition, small sample groups on a

few sites were preferable to larger sample groups on many sites. In this multisite case study, purposeful sampling was confined to fifty-one island sites covering fifteen atolls. The islands ranged in type and included: twenty inhabited islands; nineteen resort islands; six commercial agricultural islands; one agro tourism island; one industrial island; two agricultural research islands; and, two densely populated urban islands.

The island site selection process was trialled in the pilot study where I liaised with MoFA in respect of where they thought island sites would provide willing and relevant participants that were able to supply high quality data. Although MoFA provided valuable guidance in this process, I observed a suggestion by Stake (1995), and retained the final decision as to which sites and participants were selected. This ensured, as far as possible, that interesting sites and participants that were relevant to the study were included. The criteria for site selection included four main considerations: (i) a selection of island sites that would provide geographical coverage of the Maldivian archipelago and thus frame the research findings within a national context; (ii) multiple island sites that would provide more varied data than a few island sites; (iii) island sites where there was or had been a range of agricultural activity such as cooperatives, family farms, vegetable gardens in resorts; and, (iv) site stability in order to obtain both reliable and valid data unaffected by variables [such as civil unrest] irrelevant to the research.

Gatekeeper selection. Gatekeeper selection for entry into the island communities was highly significant in collecting data for three main reasons: (i) to ensure a friendly and cooperative visit to the island; (ii) to ensure that the Island authorities were aware of the nature of the visit and research being undertaken; and, (iii) suitable and willing participants could be selected for the interviews and discussions. Seidman (1991) discussed the significance of formal and informal gatekeepers in shaping the interaction between researcher and participants noting both pitfalls and advantages as bias could be displayed in how the researcher was guided in intersecting with participants. He further noted that it was the intuition of the researcher to gauge the authenticity of the gatekeeper in relation to what data the research required. The gatekeepers for the entry to the island sites in this research were typically drawn from those community members who occupied positions of respect and authority within the island, and who preferably had an understanding of farming and the English language, although the former was less of a prerequisite than the latter. Site gatekeepers included: teachers; doctors; nurses; island administrative officials; and, cooperative managers.

In preparing for a visit to a new island site, I would contact the island council to provide them with information about my research, and to request a visit to their island in order to collect data from a variety of prospective participants. Permission to visit the island and speak to participants was not an administrative requirement, however, a courteous action of this description was always well received and resulted in considerable island support in sourcing food and accommodation during my stay, as well as venues for interviews and discussions.

Participant selection. Purposeful sampling for the selection of participants in focus group discussions and semi-structured interviews was guided by the gatekeepers with myself retaining the final selection decision. There was a healthy interest from island communities in participating in interviews and discussions, with neither an abundance or shortage of participants. The selection of participants included a short discussion between myself and prospective participants within an informal setting where the following four criteria were considered: (i) the participants' general intersection with farming activity on the island; (ii) the participants' willingness to participate and articulate views in either interviews or discussions; (iii) the participants' involvement with farming activities such as cooperatives, produce transportation to markets, and trading produce in Male'; (iv) the participants' variation in age, gender, and social background. For those participants not located on the producer islands such as MoFA officials and commercial food traders, interviews were conducted without the assistance of gatekeepers. Participants appearing in field journal observations were selected randomly by myself, usually during early morning or evening walks around the islands.

**Focus group discussions and semi structured interviews:** Focus group discussions. Focus groups involved a discussion with a group of people who were knowledgeable about a specific topic (Krueger, 2008; Stewart et al., 2006). Patton (2002) further noted that the objective of the focus group was: "To get high quality data in a social context where people can consider their own views in the context of the views of others" (p. 386). The data collected was, therefore, socially constructed within the group dynamic as participants relied on group interaction of people they knew to share their ideas and listen to views, while not necessarily agreeing or disagreeing with all of the views expressed (Krueger, 2008). Glitz and Medical Library Association (1998) noted that the data gleaned from a focus group discussion could be richly descriptive about a topic and provide an insight that may not be forthcoming from a semi-structured interview. They continued, noting that the group

dynamic within a discussion could sometimes prompt emotions such as anger and laughter, which may be absent, muted, or masked, within the more intimate setting of an interview due to shyness or embarrassment. Macnaghten and Myers (2004) added that focus group discussions appeared appropriate where there were: (i) topics that people were familiar with and didn't usually discuss; and, (ii) topics that people were happy to discuss with people they knew.

Semi structured interviews. McDonough and McDonough (2014) contended that the interview allowed the researcher more control over the direction of the questioning than the focus group discussion, as it was often easier to manage the flow of responses from a few individuals rather than larger groups. Adding to this thought, Creswell (2008) noted that semi-structured interviews differed from focus group discussions in that they addressed fewer people in a more intimate setting which made it easier to extract more detailed information relevant to the research.

**Focus group discussions and semi structured interviews in this research:** This research saw 147 interviews and twenty-seven focus group discussions conducted. The interview was regarded as the more nimble and flexible data collection tool as it allowed for a more intense line of questioning where participants were asked to provide specific information, and to clarify emerging contradictions and confusion. The focus group discussion adopted a gradual and less intensive approach towards questioning in order to draw out the farming generalities, and then focus on specific areas relevant to the research questions. As discussed by McDonough and McDonough (2014), the gradual and less intensive line of questioning in focus group discussions had the effect of comforting the participants with familiarities, before channelling them into specific areas of discussion relevant to the study.

**Figure 16. Focus group discussions and interviews in this research.**



*Source: Paul Van Driessche.*

Participant consent in focus group discussions and interviews. According to Taylor and Bogdan (1984), the following five points should be considered by the researcher and participants in obtaining the participant consent prior to the discussions and interviews: (i) the investigator's motives and intentions, and the inquiry's purpose; (ii) the protection of the respondents through the use of pseudonyms; (iii) deciding who has the final say over the study's content; (iv) financial remuneration, if any; and, (v) logistics with regard to time, place, and number of interviews and discussions to be scheduled (pp. 87-88). In terms of this study, three additional points were considered which included: (i) transcription services for the interviews and focus groups were provided by sources unconnected to the participants; (ii) participants were offered a copy of the research findings once completed; and, (iii) financial remuneration was not offered to the participants as the monetising of their participation would have caused them embarrassment. However, refreshments were offered during the interviews and discussions which were gratefully received. Appendix 6 is a copy of the Participant Consent Form, which was explained in English and Dhivehi to participants after my introduction and then given to participants for signature.

No participants in this research refused consent for any interviews or discussions, nor did any decline their participation after agreeing to take part.

Format of the focus group discussions and semi structured interviews. Interviews had between one to three participants, while focus group discussions accommodated between four to thirteen participants. The discussions and interviews used the same six-point introductory format whereby there followed: (i) an introduction of myself, and the nature of the research; (ii) my request for the audience to participate in either the interviews or focus group discussions; (iii) an explanation of the consent form, and the confidentiality of the material; (iv) the signing of the consent form; (v) conducting the icebreaker survey; and, (vi) conducting the discussion or interview. The introduction and consent form signing took approximately ten to fifteen minutes depending on questions raised by the participants. The ten-minute icebreaker survey followed with nine questions enquiring about participants' general farming. The icebreaker survey was not used for interviews with non-farmer participants such as resort operators and cargo transporters, or where there were greater numbers of participants in the focus group discussions due to time constraints.

The discussion and interviews used the same twelve open ended questions where the questions guided the conversation towards subjects relevant to this research. The discussions and interviews each lasted approximately forty minutes although where there

were more participants in the focus groups, the timeframe was sometimes extended at the request of the participants. Appendix 7 illustrates the introductory format for the interviews and focus group discussions, provides a copy of the icebreaker survey, and details the twelve questions used to guide the interviews and discussions.

Venues. The interviews and discussions were conducted in locations convenient to the participants, and offered privacy, cooling ventilation, access to drinking water and light refreshment, and bathroom facilities. The focus group discussions usually took place in school halls or island meeting rooms at around 8.30 p.m. when most work activities for the day had concluded. They were conducted by participants sitting in a semicircle around a desk where a flip chart or white board was used to record salient points. The interviews took place at any time and venue that was convenient to the interviewee which could equally be in the work office, at home, or on the farm.

Delivery of the interviews and focus group discussions. Whilst the format of the questions guiding the interviews and discussions was the same, my stance in delivering the questions depended upon the quality of the participants' previous responses, and the type of information that I was trying to obtain. Merriam (2009) suggested various stances in guiding the flow of the conversation in order to elicit the desired information. She noted that the stances ranged from: hypothetical; idealised; interpretive; and, devil's advocate. Within this data collection, all stances were considered, particularly the latter which often elicited a jovial response from participants.

The pilot study trialled an alternative icebreaker to the quickfire farming survey used in the main data collection. The pilot study icebreaker consisted of participants drawing a map of their island where they identified such aspects as the best farming land, plentiful water supply, areas of pest infestation and so forth. Unfortunately, the composition of the map took far longer than the allotted ten minutes, and when completed the participants thought the mapping exercise was the discussion and decided to leave. Whilst all participants were generous with their time, and most were forthcoming in their views, I realised that I could only rely on a maximum of one hour per discussion or interview. Therefore, the pace of both interviews and discussions had to be managed carefully by myself in order to maintain the interest of the participants whilst eliciting the information I required.

During the early stages of the focus group discussions all participants were encouraged to articulate their views. Women generally waited for the men to take the lead before

contributing to the discussion but became more assertive in expressing their views both through emerging spokeswomen, and on an individual basis, as the discussion progressed. Men tended to state their opinion in a separate conversation either before or after the women had finished speaking, but rarely in unison with the women. Men also appeared to feel more comfortable discussing their views with other men or male outsiders either within a group or on an individual basis, whilst women seemed to be less shy in discussing their views within a group of women that they knew.

I believe both the interviews and discussions were as enjoyable for the participants as they were for me. Participants particularly appeared to enjoy the social interaction of the group discussion where numerous exchanges resulted in a smooth flow. The participants responses from both data collection methods were interesting, and in many instances enlightening, causing me to rethink some of my former ideas about Maldivian agriculture. My interview style was interspersed with humour which seemed to resonate well with participants. Some participants drew me aside after the discussions were completed in order to convey additional views, mostly positive, but occasionally negative believing I could provide solutions.

Translation. Translation services were provided for all of the group discussions and only five interviews. I spoke and understood very little Dhivehi, while the majority of participants had a reasonable understanding of the English language. The gatekeeper and/or myself selected one translator per discussion with different translators attending each of the discussions and interviews. This provided for a robust generalizability in the translated responses, as the translators on different islands were distinct from each other and unaware of previous translations. Whilst there was no way of ensuring the accuracy of the translations in terms of bias exhibited by the translator, emergent themes from the various translated responses suggested a confluence of understandings and meanings from the participants. There were also outlier challenges by some participants which sometimes contributed to themes or remained in isolation. The significance of bias within personal interaction between the researcher and the participants in the research is discussed further in section, *3.6. The validity, bias, and ethics, of this research.*

Recording the interviews and focus group discussion. The interviews were recorded using an unobtrusive mobile phone with an inbuilt digital recorder[32]. In the case of discussions with

[32] Most people placed their mobile phones on the table when seated, so my phone was just another phone on the table.

many participants, additional hub microphones were used in conjunction with a laptop computer. As suggested by Padgett (1998), notes were also taken of key points and issues that required further consideration, although note taking was kept to a minimum as it proved somewhat disruptive to the flow of the discussions as participants paused and enquired what I was writing.

I had anticipated some reluctance from participants over the audio recording of the interviews and discussions but offered the explanation that this was due to my inability to write quickly enough to record their responses accurately. Participants understood this situation, and with the exception of one interview, all interviews and discussions were audio recorded[33]. I informed participants of each interview and discussion when recording commenced and finished.

Transcription of the recordings. The interviews and discussions were professionally transcribed by a facility in southern India familiar with the English and Dhivehi languages. The transcriptions were then compared with the recordings with anomalies and corrections noted in the margins of the transcriptions. Merriam (2009) noted that re-reading transcribed material provided a closer connection with the raw data of the research, which in this research was certainly the case.

**Field journal observations:** A total of 153 field journal entries were carried out in this research. In his discussion on observation as a data collection tool for qualitative research, Patton (2002) suggested that it should be undertaken with keen attention to detail, and with descriptive recording, so as relevant information can be identified and later validated. Merriam (2009) added that the recording of key words and remarks was as important as the reflections of the observer about the subject being studied. She continued by noting that observations should be "first hand" (p.119), with Creswell (2008) positing that observation should reveal real time phenomena rather than perspectives or recollections of past experiences.

Field journal observations and reflections in this research. In this research, I occupied a midway point in Gold's classification continuum between being distinct from the observation to becoming too immersed in the observations activity (Gold, 1958). The midway point I occupied involved me being foremost an observer while also allowing myself the opportunity to engage in conversation with participants where I deemed it appropriate

[33] One participant was uncomfortable about being taped due to the position of authority he occupied on the island.

in eliciting more of the information I required. In this way, I observed experiences rather than being an integral part of the experiences. I believe this casual interaction was familiar and comfortable for participants, and also allowed me to answer participants' questions when required; this often contributed to the flow of the observation.

Merriam (2009) noted that in observations participants would typically exercise a greater level of control in what information was revealed in comparison to interviews and group discussion, as there was no pre-arranged agreement, consent, or understanding concerning their interaction with the researcher. During my research, I did not find this to be the case, and in some instances, it was quite the opposite with participants venting forth on sensitive issues that they would not have articulated in an audio recorded interview or discussion.

Observation selection. Observation selection was a semi random process in terms of what and when observations were carried out. In this research, I sometimes placed myself in situations that I knew intersected with island farming activity such as visiting a local agro dealer shop or produce market in order to observe how farmers, customers, and traders interacted with each other. In other instances, such as ferry trips between islands, I observed the transportation of produce between islands and onwards to the Male' market. Observations of farmers would usually take place during my early morning or evening walk around the island where I would casually chat with them whilst they were tending their field plots. The initial greeting of the farmer by myself provided a crude indication of the farmers understanding of English language which informed me how to pursue the conversation, if at all.

The benefits of adopting semi random observation was threefold: (i) it reduced the possibility of the farmers being briefed beforehand about what to say to me; (ii) it negated the consideration of translator bias; and, (iii) it intuitively allowed me to pick and choose participants and situations which to observe. Random observations were also recorded to a lesser degree where situations I encountered in everyday life related to the research.

Recording observations. The recording of observations was assisted by a small notebook and from memory. However, as recommended by Bogdan and Biklen (2007), the observation was written up as soon as possible so as to minimise the chance of forgetting information. The notes were recorded in a field journal where Patton (2002) had suggested the following six factors be included in the entries: (i) the physical environment of the observation; (ii) the characteristics of the participants and their interaction with each other;

(iii) the interaction between the participants and the activities they were involved in; (iv) the content of the conversations between the participants, and between the participants and the observer; (v) the meanings of the conversations that took place, and the meaning of the conversations that did not take place; and, (vi) self-observation, and the participants' observation of the observer. Pictorial data accompanied my observations in order to contribute a fuller account of the subject being observed.

In addition to the observations, the field journal included my reflective comment of the phenomenon being studied where my feelings, interpretations, initial hypotheses and so forth, were recorded. These reflections were rooted in my past professional and personal experience of working in local agriculture and living in the Maldives.

## 3.5. Data analysis

In her discussion on data analysis in case studies, Merriam (2009) stated: "Conveying an understanding of the case is the paramount consideration in analysing the data" (p.203). She continued to note that in presenting the data, "Categories, themes, models or theory" (p. 204) may be constructed and used to assist in understanding the case. The data analysis in this research aimed to present a series of codes which tracked the case of farmers in the Maldives relating to the research question.

**Themes and categories:** In constructing themes and categories, Hammersley and Atkinson (1983) suggested the intensive reading and re-reading of the raw data to ensure relevant points were included and accurately grouped. This would identify frequently mentioned and contrasting themes, and those themes that were of particular significance (ibid). Hammersley and Atkinson (1983) continued that themes present in a particular data set could be compared with themes across different data sets and then grouped into categories to see where commonality and irregularities resided. Cohen et al. (2013) described the comparison of data as data triangulation where comparison of data from multiple sources obtained through multiple collection methods was undertaken. This was with the aim of explaining human diversity from different viewpoints (ibid). In this research, emergent themes from the data were coded into categories which were further reductively coded into a final six-point farming framework as previously mentioned. Coding of the data was managed utilising NVivo software[34].

[34] NVivo is a software package used in managing data.

**Data Triangulation:** According to Cohen et al. (2013), the process of using multiple data collection methods and multiple data sources was referred to as strong triangulation. This was distinct from weak triangulation where there was only one method for collecting data from multiple data sources (ibid). In pursing strong triangulation, Bogdan and Biklen (2007) warned of data overload where its source and relevance becomes confused. Creswell (2008) contended that confusion from data overload could be mitigated by visiting one site at a time and recording its data timeously, before moving onto the next site. He further contended that managing the data on a site by site basis would allow the first levels of analysis to take place where each sites data could be tagged, cross-checked, compared, and contrasted to previous sites, before moving onto the next site.

This research employed strong triangulation where multiple data collection methods included semi structured interviews, focus group discussions, and field journal observations. The data collection methods targeted multiple data sources comprising 373 participants who were divided into twenty-two categories. These included farmers, boat crews, food customers, government officials and so forth. Appendix 8 illustrates the categories of participants interviewed. The data was contrasted and compared, with its reliability and validity tested on participating audiences. Sites were visited on a site by site basis with timely entry of data using the NVivo programme. Site visits typically lasted between three to four days which provided sufficient time for data collection, entry, and checking to be completed on site. Revisiting sites was not possible during the research due to time and budgetary constraints hence, any additional data clarifications were conducted over the telephone, or when participants happened to be visiting Male'.

**Coding:** Miles and Huberman (1994) suggested that the data should be coded in order to make the categorisation of the themes a process that was manageable, thus reducing the risk of an unmanageable data avalanche. Corbin and Strauss (2008) concurred with this suggestion when they posited that the coding of data should be divided into three main sections: (i) open coding where any piece of data relevant to the study is tagged; (ii) axial coding where the relationship between the properties of the category and the category itself are examined; and (iii) selective coding where the core categories and hypothesis are examined and developed. Bogdan and Biklen (2007) further noted that the researcher, as the instrument of data collection and analysis, also needed to determine a cut-off point in analysing data in order to retain clarity in addressing the main research issues. In this research, the preceding views on coding were all taken into account as I devised a coding

strategy that I felt best managed the data into groupings that most accurately reflected the participants' voice.

Coding of the data in this research involved the identification of key words, sentences, and explicit and implicit meanings from the interview and discussion transcripts, and from the field journal entries. The coding also included what was not said in some instances. The identified data was highlighted from the text and grouped together into nodes using the cut and paste functions of the NVivo software. The nodes, or codes as I referred to them, comprised multiple groups of sub codes that were gradually reduced to ten codes comprising forty-three subcodes. The ten codes were reduced to six core codes which then formed the basis for the six-point farming framework as noted at the beginning of this chapter. Codes were based on the highest number of participants expressing a similar viewpoint together with the highest number of references to that viewpoint. In most coding, the highest numbers of participants corresponded with the highest number of references.

Coded data was presented in the findings chapters four, five, and six of this research. In chapter four which addresses the first supporting question: *What do farmers in the Maldives understand by the terms 'sustainable agriculture', and 'building capacity in agriculture'*? two codes comprising nine subcodes are presented. Chapter five addresses the second supporting question: *What are the key factors encountered by farmers in the Maldives?* where seven codes comprising thirty subcodes are presented. Chapter six addresses the third supporting question: *What measures do farmers in the Maldives believe will help build their agricultural capacity through sustainable means?* where one code comprising four subcodes is presented. As previously mentioned, Chapter 7, *Discussion. Farmers in the Maldives building capacity through sustainable means* presents on overview of the ten codes from the three findings chapters in table 15. Following on, table 16 presents the six core codes to emerge from the ten codes; this is accompanied by a discussion. Table 17 follows presenting the six-point farming framework derived from the six core codes; this is accompanied by a discussion answering the main research question.

## 3.6. The validity, bias, and ethics, of this research

In their discussion on validity, reliability and ethics, Cohen et al. (2013) believed that validity in qualitative research was best addressed through factors such as thick rich description, honesty, authenticity, subjectivity, and depth of feeling. In reference to research reliability,

Merriam (2009) noted that it was: “Imperative that researchers and others have confidence in the conduct of the investigation, and in the results of any particular study.” (p. 210). In the case of ethics, Patton (2002) observed that the ethical competency of the researcher ultimately decided the validity and reliability of research. The fusion of these three concepts in terms of their practical application to this research is considered in the next section.

**Validity:** The data collected in this study was subjected to three validation strategies as suggested by Merriam (2009): (i) participant validation where the views of the participants were re-checked with the participants to see if they were correctly interpreted; (ii) immersion validation where closeness to the participant was obtained in order to elicit as much similar and contrasting data as possible; and, (iii) reflexive validation where my own bias, assumptions and perceptions, were self-examined. The use of the three validation strategies proved effective in clarifying some issues that had become confused both in their articulation by the participants, and in my comprehension of what was being said. They further amended incorrect interpretations I had previously made from the data. The three validation strategies confirmed the reliability of the data recorded with the results being consistent with the data upon which they were based. Continuing validation of all aspects of the research was sought from my academic supervisor and the department at Imperial College London through which this research is conducted.

**Bias:** In strengthening the validity of a study, Cohen et al. (2013) observed that recognising bias, and trying to reduce it was difficult to implement. Creswell (2008) commented on participant bias when he noted that the researcher would only ever be able to record the prevalent thoughts of the participant at the time of the interview, including bias whether recognised as such or not. Guba and Lincoln (1994) commented on researcher bias when they contended that whilst the researcher was able to gauge and guide the interaction with the participant, the subjectivity of the researcher may result in bias either in the way in which the interaction was guided, in what the researcher decided to record, and the way in which it was recorded.

In terms of this research, my recognition of participant bias was recorded within the data collection process sometimes in note form during the interviews and discussions, but usually when compiling notes at the end of the participant interaction. Examples of bias were generally found within socio cultural issues, particularly concerning participants’ interpretations of government actions designed to assist their farming efforts. In recognising participant bias, I attempted to investigate why it existed whilst recording its presence

within my notes. My own bias was routed within past living and working experiences within the Maldivian agricultural sector. In recognising my bias, I liaised with academics both in the Maldives and my supervisor at Imperial College in order to seek their views on how it would intersect and impact upon this research.

In overcoming bias, Cohen et al. (2013) suggested that bias checks should be carried out on the researcher, the participant(s), and the questions and statements presented in the data collection tools. In doing this, Merriam (2009) suggested that the research should adopt a helicopter view of the phenomenon being examined where much of the preconceived notion disappears, and a clear uncluttered view of the situation below is presented.

**Ethics:** Cohen et al. (2000) posited that although ethical concerns or dilemmas could erupt at any stage in the research process, it was the way in which the researcher decided to deal with the eruptions that was the main ethical concern. Taylor and Bogdan (1984) exemplified this point when they discussed "Ethical and political choice" (p.71) where the researcher had to gauge whether or how to intervene in cases of coercive or fraudulent behaviour by participants. Patton (2002) argued that whilst ethics within the research process could be shaped in part by predetermined guidelines such as the protection of participants, and the right to privacy and informed consent for participants, it was the values and ethical stance of the researcher that ultimately decided the trustworthiness of a study. In a similar vein, Patton (2002) continued to say that that the issue of ethics in research was then largely governed by the integrity of the researcher in the way he interacted with the participants, and the data he chooses to elicit and include within the analysis.

The ethical probity of this research was shaped by the guidelines of the British Sociological Association (Bulmer, 1982) which included: (i) guaranteeing the anonymity of the participant in terms of the information they provided, and their participation in the data collection process; (ii) obtaining the informed consent of the participant prior to the commencement of the interview or discussion; (iii) accessing the participant and their environment in an open and transparent manner where the nature of the research was explained in conjunction with their part in it; and, (iv) keeping all data private, confidential, and protected by restricted access protocols.

In further consideration of the ethical probity of this research, the following were noted:

- I received approval to proceed with this research from the Ministry of Fisheries and Agriculture in the Maldives. Please see appendix 9.

- A pilot study was initiated prior to the commencement of the research in order to test data collection methods and gauge the reaction of participants to the data collection methods.
- The Ministry of Fisheries and Agriculture and myself deemed this research to be uncontroversial, not of a sensitive nature, and not likely to cause offence to any of the stakeholders.
- I undertook a self-bias check of my approach to the research recognising that my previous interaction with Maldivian agriculture may colour the way in which I elicited and interpreted data from participants. I also needed to check how I viewed the participants' views of me visiting their islands. As many of the islands and participants visited during the fieldwork were not known to me, I was able to dilute the typically held perception of a visiting Caucasian male either being a tourist or attached to a donor/government office.

All participants referred to in the findings of this research were noted in the broadest terms such as in reference to their general occupation. I did have reservations that controversial points raised in discussions and interviews maybe discussed outside the meetings which had the potential to cause embarrassment or worse to participants in such small island communities. However, when I broached this concern with gatekeepers and participants, their reaction was quite unexpected as they appeared indignant at the prospect of not being talked about by the community if they had raised controversial points.

## 3.7. Challenges of the research

**Researcher orientation:** Seidman (1991) noted that the background against which the interaction between the researcher and participants took place was important as both parties may see race, gender, and social class, as influencing how questions should be asked, interpreted, and answered. Liamputtong (2010) added that outsiders working in cross cultural settings could be perceived as misunderstanding or not empathising with local intentions and actions, as they lacked the contextual awareness of their locale.

In terms of this research, I could have been perceived as an outsider in that I was a non-Muslim Caucasian male of middle age, interacting with mixed gender Muslims of varying ages and social standing within island communities. However, my long association with the Maldives meant that I was sufficiently embedded within the community so as not to be regarded as an outsider but rather someone who had a degree of familiarity with the

Maldivian agricultural context. This was illustrated throughout the fieldwork as some islanders noted they had met me before and commented to other islanders who did not know me: 'he is with us', or 'he knows us'. In this way, I was regarded as being connected to local farming experiences, but not directly involved in them.

My position in the research was conveyed to participants as one of a researcher who wanted to find out and learn about the participants' farming experiences, rather than someone who was judging, criticising, or requesting that they do things differently. In responding to this approach, the participants exhibited willingness to engage in conversation with me about their experiences in a free and open manner. I believe the participants' responses were largely an honest reflection of their thoughts and agricultural experiences, rather than a contrived view based on what they thought I wanted to hear, or what they perceived to be the correct answer.

**Research method:** Guba & Lincoln (1994) noted that no process of examination was, or could be, deemed unquestionably right in understanding why people behave the way they do. In considering this sentiment when planning this research method, I had aimed to provide a robust generalisation of how farmers in the Maldives interpreted their agricultural experiences through the medium of a multisite case study. I believed the selection of this research method would probe into the sociocultural context of island farming communities revealing the reasoning behind the challenges farmers encountered and provide suggested solutions in overcoming them. I further believed that a multisite case study pursuing a phenomenological line of inquiry could provide high quality data that could be coded and would ultimately provide the answer to the research question.

My belief was correct. However, the multisite case study generated large quantities of data which had taken over one year to code. Whilst a case study that focussed on one island site would have been simpler to conduct in terms the logistics behind a site visit, I believed that multiple data sources providing multiple experiences would provide a more holistic representation of the Maldivian farming story.

## 3.9. Chapter summary

In this research, my presence within island communities was regarded as 'friendly'; whilst obvious that I am distinct from the islanders in religion and race, there was a level of understanding amongst participants that we were bound as I studied their case in an

attempt to improve their farming experiences within and among the Maldivian islands and atolls.

This multisite case study where data was collected through semi structured interviews, focus group discussions, and field journal observations, from multiple sources situated on multiple sites, provided a robust and original generalisation of the Maldivian farming story. Within this story, facets of the sociocultural, environmental, and economic context in which farming resides were brought to the fore. These facets were analysed through a reductive coding process which saw the emergence of six core codes, and in turn, the six-point farming framework which answered the main research question.

The next chapters four, five, and six test the robustness of the methodological approach to this research as the findings of the data collection are analysed and presented in a series of subcodes and codes.

# Chapter 4. Findings (1). Farmers understanding of the terms 'sustainable agriculture', and 'building capacity in agriculture'

## 4.1. Chapter introduction

Chapter 4 presents the data collected from participants in this research relating to the first supporting question:

- *What do farmers in the Maldives understand by the terms 'sustainable agriculture', and 'building capacity in agriculture'?*

The main data addressing the first supporting question was derived from two open ended questions asked of the participants:

- *Q10. Have you heard of the word 'sustainable'? If so, you may know that this word is sometimes used with the word agriculture, 'sustainable agriculture'. What do the words 'sustainable agriculture' mean to you?*
- *Q11. Have you heard of the words 'building capacity'? If so, you may know that these words are sometimes used with the word agriculture, 'building capacity in agriculture'. What do the words 'building capacity in agriculture' mean to you?*

Both questions were positioned near the end of the discussions and interviews in order to provide an opportunity for participants to reflect upon the preceding discussion before answering the question.

From the data collected for this chapter, codes 1 and 2 emerged which addressed the participants' understanding of the terms 'sustainable agriculture', and 'building capacity in agriculture' respectively. In this chapter, as in the case of chapters five and six, coded data was presented in table form at the beginning of each code section. The tables indicate the numbers of participants that discussed particular issues, and the frequency with which the participants discussed the particular issues. Discussion of the coding appears in chapter 3, *Methodology.*

## 4.2. Data collection and codification

Data was collected from participants on fifty-one islands spanning fifteen atolls where 373 participants contributed to 147 semi-structured interviews (interviews), twenty-seven focus group discussions (discussions), and 153 field journal observations (observations). Coding was determined deductively from personal experience and a prior pilot study provided guidance, and inductively through observations and emerging points from the interviews and discussion. Code overlapping and interconnectedness occurred frequently in the analysis of the data where emergent themes were applicable to more than one code. For example, the prominence of migrant agricultural labour as a valuable resource also appeared as a contributory factor to the stigmatisation of agriculture as a low-class activity and a disincentive for youth participation in agriculture. In this chapter, themes that were inextricably bound within the participants' understanding of the terms 'sustainable agriculture', and 'building capacity in agriculture' also appeared in later codes without reference to the two terms.

The data codification was assisted by NVivo™ software which enabled data to be collated into themes and then categories before being coded into subcodes, codes, and core codes. The coding relating to the first supporting question is now presented.

## 4.3. Coded data

**Code 1** **'Sustainable agriculture' means: profitable farming over a long period; soil and water conservation; enhanced access to input resources; and, stable links to the market.**

**Table 5. Code 1.**

***'Sustainable agriculture' means: profitable farming over a long period; soil and water conservation; enhanced access to input resources; and, stable links to the market.***

| Code: 1 | Sub code: 1a, 1b, 1c, 1d, 1e, 1f. | | No. of participants | No. of references |
|---|---|---|---|---|
| *'Sustainable agriculture' means: profitable farming over a long period; soil and water conservation; enhanced access to input resources; and, stable links to the market.* | 1a | *'Sustainable agriculture' means profitable production, which is derived from stable markets, expanded production utilising technology, and a reduction in imported food.* | 53 | 63 |
| | 1b | *'Sustainable agriculture' was linked to longevity in farming through the words 'continue', 'forever', and 'long time'* | 51 | 73 |
| | 1c | *'Sustainable agriculture' means reducing the polluting impact of chemical pesticides and fertilisers on soil and water resources, and human health.* | 37 | 47 |
| | 1d | *'Sustainable agriculture' means enhanced access to land, funding, and farming inputs.* | 26 | 32 |
| | 1e | *Little or no knowledge of the term 'sustainable agriculture', and it doesn't exist anyway.* | 18 | 19 |
| | 1f | *'Sustainable agriculture' means the acquisition and use of knowledge in agriculture.* | 14 | 27 |

| | | | | |
|---|---|---|---|---|
| | | ***Total:**<br>** Any individual participant may have mentioned a theme more than once (or) on multiple occasions during the interview/focus group.* | **199** | **261** |

## Code introduction

Participants' understanding of 'sustainable agriculture' covered a range of themes, of which profitability in farming derived from stable market pricing and a reduction in food imports was a priority. Further themes considered included the notion of longevity in farming, and land stewardship where water and soil conservation were acknowledged as being under threat from pesticide and fertiliser pollution. Comment on the building of agricultural knowledge as a foundation of 'sustainable agriculture' was also included in this code, particularly in encouraging youth participation in agriculture.

### Subcode 1a: *Sustainable agriculture means profitable production, which is derived from stable markets, expanded production utilising technology, and a reduction in imported food.*

This subcode comprised commentary from fifty-three participants (63 references) and was divided into four main sections: profitability; stable markets; production and technology; and reducing imported food.

**Profitability:** Forty participants in this sub code believed sustainability and profitability were inextricably linked (48 references). Profitability was understood as being derived from stable markets, expanded production utilising technology, and a reduction in imported food. In a discussion with five participant farmers on a large agricultural island, one farmer noted: "Farmers are attempting sustainability in farming, and they are doing that to earn profit" (D#20). Participant husband and wife farmers further observed: "Sustainable farming means getting better income. We can produce more food if profit is there" (I#3). And one participant cooperative member added: "I can manage with what I get from the farming, and I grow enough for the demand that I get. So that means I make profit after all my expenses and everything. So that means I believe that my farm is sustainable" (I#70). Elaborating on the point of covering costs, one farmer in a discussion with thirteen participant cooperative farmers observed:

> If I spend MVR100 [ 5], I have to get more than MVR100 [ 5] back. This means, I can be sustainable. If I spend MVR100 [ 5] and I get MVR90 [ 4.50] back, it means I cannot be sustainable and I cannot do this farming. If I spend 100 and get 100 back, I still have to do other work so not sustainable. So, for me farming has to be more than covering my costs to be sustainable, it has to make more than the costs, otherwise I will not do all the hard work.

> I am not farming to keep the same level of money; I am farming to increase my money. Farming is only sustainable if I am getting more than I am spending (D#17).

One of six young participant farmers in a discussion added to this topic when he noted: "What I want to say is people who started the farming, and who are not getting enough money for his costs, they will give up farming. There is no point to lose the money" (D#21).

Two outlier comments conclude this section on the understanding between profitability and agricultural sustainability. The first came from a participant commercial farmer who contended that the only way farming in the Maldives could be profitable, and thus sustainable, was for farmers to link their production directly to the food demand of neighbouring tourist resorts (I#102). The second point came jointly from a participating women's development committee and from a participant NGO official who both discussed the notion of reinvesting profit from community farming in order to encourage more community farming (D#25), (I#99). The NGO manager noted: "Sustainability in farming for us means looking at community profit to put back into community farming to make more community profit. And so, it can go on in that way" (I#99).

**Stable markets*:*** Thirty-eight participants believed that stable market pricing, and stable consumer demand could be generated by regularised production flows to markets where price volatility would be minimised as a result of fewer gluts and shortages of food items (49 references). This in turn would lead to improved profitability. As observed by one participant farmer: "Sustainable farming is continually taking our produce to the market every day and every week, so the market always has enough food. This should keep the prices roughly the same, and we can make the profit" (I#76). A participant MoFA official reiterated the importance of uninterrupted production flows creating stability in local produce markets:

> I believe sustainable agriculture means farmers being able to produce regularly and sell their products regularly. Like this there should be few price fluctuations in the market, and the farmer will know the price he is going to get. This will help him plan his planting (I#129).

In spite of this sentiment, a participant cooperative official noted in a discussion with twelve cooperative members that production was sporadic in the Maldives, and typically dependent upon two seasonal monsoons, and the religious month of Ramadan: "We used to plant in the rainy season, and harvest in the dry season, but now the weather is mixed up, so we plant when we can, and sell when we can. They always used to be sold at the market but now it is difficult to sell them because of all the food imports" (D#17). In terms of spikes in production and demand during Ramadan, a discussion with five participant fishing cooperative members noted that all the ladies on their island planted watermelon for

Ramadan but did little other planting once the Ramadan rush for watermelon was over (D#15).

An outlier comment from a participant resort manager debunked the notion that stable markets could ever result from local productive capacity. Instead, he argued that stable markets where pricing, quality, quantities and delivery were consistent were only created in the Maldives by food imports from external suppliers. He noted: "If you ask me what sustainable agriculture is, I will reply it is relying on food flows into the Maldives from other countries. Sustainable agriculture in other countries produces food for the Maldives" (I#138).

**Production and technology:** This subcode saw nineteen participants link their understanding of 'sustainable agriculture' to expanded local production utilising technology in order to generate profit for their farming (22 references).

Fifteen participants noted that expanded local production was deemed an integral part of achieving sustainable agriculture (19 references). In achieving this objective, participants believed they could improve production in terms of quantity, quality, and variety. However, thirteen out of the fifteen participants noted the challenge of lower priced food imports resulting in pricing challenges for local farmers who were unable to compete due to high local production costs (15 references). In terms of expanded production, a discussion between four participant resort agricultural workers noted that existing crop production could be increased in the Maldives with new varieties considered in order to make agriculture more sustainable (5 references):

> We grow lettuces and fruit now, and we can produce more of them. We can also produce new things like chicken meat and eggs. If we can do this, we will become more sustainable in agriculture in this country, and we can cut some food from outside [imports] (D#26).

Seventeen participants noted that sustainable agriculture could be achieved through increased productive capacity that was driven by the introduction of technology which could increase crop yields and reduce harvesting wastage (20 references). In utilising new technology, a participant schoolteacher noted that farmers on his island liked to experiment with new products and equipment sourced from the internet (I#41). A participant commercial farmer added: "If we have sustainable agriculture we should use technology like greenhouses" (I#126).

Agreeing with the use of technology in building sustainability in agriculture, a group of four participant young farmers[35] countered that the technology option was limited by money and knowledge in purchasing and implementing the technology (5 references). One participant young farmer commented: "And also he can't do this farming hydroponics. He needs money to get some equipment, and he has to know what to do" (I#78). Another participant young farmer in the same group provided a differing view of technology when he implied that low or alternate technology costing little money would be of more use to farmers: "I also think that for sustainable farming, we have to now change to more natural ways of growing like composting and also other sustainable means, but we need to know how to do this" (I#78). The issue of composting appeared in greater detail in subcode 7d, *Limited access to farming inputs such as equipment, pesticides, seeds, and fertilisers.*

**Reducing imported food:** Twelve participants assumed that by reducing the high level of food imports into the Maldives, local agriculture would have an opportunity of expanding its productive capacity to in order to provide more food to the local market (14 references). This assumption was viewed as contributing to sustainable agriculture in the Maldives as increased supplies to the tourist sector would increase agricultural profitability (O#141). A participant resort chef elaborated on this assumption when he noted:

> In the Maldives, we can produce more fruit and vegetables, and some different varieties, so we can cut down on these items coming from Dubai, India, and Europe. This will give the farmers here a better chance to grow more items, make money, and be sustainable. But they must do the growing not just talk about it because we have to feed out guests. But we cannot produce beef, lamb and some other items, so we need to keep those imports coming in(I#86).

A participant MoFA official was sceptical over the assumption that the gap in national food stocks created by a reduction in the level of imported food could be filled through local production. The official noted that although controls on food imports were persistently requested by farmers unable to compete with imported food pricing, quality, and continuity of supply, consumers benefitted from such competition (I#120). The official further contended that benefits of imported food flows were expected by a market that regarded local production as a minor contributor to national food security. The MoFA official concluded that food imports then contributed to sustainable food security if not sustainable agriculture (I#120).

[35] In this study, young farmers, or youth, typically referred to male participants ranging from 17-28 years old.

The issue of food imports impeding the progression of sustainable agriculture in the Maldives was a theme that peppered the data collected in this study and featured as a code in its own right as code 6, *Farmers believe that reducing food imports will boost local production.*

**Subcode 1b: *Sustainable agriculture was linked to longevity in farming through the words 'continue', 'forever', and 'long time'.***

This subcode comprised commentary from a total of fifty-one participants (73 references). Analysis of this subcode revealed participants' use of the words *'continue'* (34 participants, 43 references), *'forever',* (10 participants, 18 references) and *'long time'* (7 participants, 12 references) to convey the notion of longevity in respect to their understanding of sustainable agriculture. In a discussion with six participant women's development committee members, one member captured the sentiment of the discussion when she noted: "Farming is a *continual* activity that goes on for a *long time*. You must make sure to *continue* caring for your crops on a daily basis" (D#25). Repeating the notion of continuance within his understanding of sustainability in agriculture, a participant commercial farmer observed:

> Well, firstly sustainable means that it can be a *forever* kind of thing that goes on for a *long time*. So, for my farming, I want to make sure that I can sustain farming without help from anyone else like banks or government. It should *continue* on its own way (I#110, my italics).

Summing up the notion of longevity*,* as it related to the term 'sustainable agriculture', one participant women's development committee member noted the sentiment of five out of nine participant committee members: "See, we have to do farming for *long time* to get the benefit. If we can *continue* doing farming very well for a *long time* it can be sustainable farming." (D#27, My italics). A comment from a participant MoFA official noted: "I would say sustainable agriculture is the agriculture which carrys on farming *forever* in a way that lengthens or increases the life of the farm itself" (I#53. My italics).

From the icebreaker survey carried out prior to the commencement of interviews and discussion, it was noted that most participants in this research attached a timeframe of between three to thirty years in order for farming to be considered sustainable. At the lower end of this scale a discussion with four participant Bangladeshi agricultural labourers, noted that their understanding of sustainable agriculture meant that the farm had to be functioning profitably for three to four years (D#14).

**Subcode 1c:** ***Sustainable agriculture means reducing the polluting impact of chemical pesticides and fertilisers on soil and water resources, and human health.***

A total of thirty-seven participants discussed the polluting impacts of chemical pesticides and synthetic fertilisers on soil and water resources, and ways in which this may be mitigated through adaptive farming practices (47 references). This subcode comprised five main sections: organic farming; poor soil quality; water conservation; public health; and, environmental protection.

**Organic farming*:*** Fifteen participant farmers discussed organic farming as an adaptation action for reducing rather than removing the use of chemical pesticides and synthetic fertilisers from production; chemical reduction in the production process was understood by participants to reduce water and soil pollution thus enhancing sustainability in agriculture (17 references). In terms of understanding the term organic farming, a participant farmer commented its frequent misuse and understanding by farmers when he noted:

> Our farmers do not really understand what organic or sustainable farming means. What they are really talking about is doing farming in a more natural way using less chemicals for a long time. Organic farming sounds good because it comes from Europe. We do not have any organic food produced in this country, and there is not any certification for organic food. Because farmers think they are doing organic farming, they think their farming is sustainable, but it is not (I#126).

Conveying their understanding of growing organic produce, one of the two participant chefs in an interview noted: "Sustainable agriculture means growing vegetables with a friendly involvement, and not using chemicals. It is better to use organic fertilizer and organic everything" (I#136). The second chef articulated a similar sentiment but in stronger terms: "You don't use chemicals for sustainable farming! You can use organic compost and friendly insects. No chemicals!!" (I#136). A participant farmer from a well-known agricultural island reinforced the ideal of organic farming as being sustainable, but with the added insight that its introduction may result in production and profitability shortfalls: "The problem in being organic is that it makes the production a little bit low. So, we may lose some money this way, and not be sustainable" (I#50). A participant MoFA official noted that if 'correct' organic farming was undertaken in the Maldives, lower production yields and higher input costs would almost certainly result in reduced profitability, and thus, sustainability(I#53).

**Poor soil quality:** Voicing concern over nutritive depletion of the soil, a participant teacher directly linked her understanding of sustainable agriculture to maintaining soil quality for future generations of farmers: "If it is sustainable agriculture, we should be able to use the

soil for a long time so our children can also farm the same soil. So, we have to look after the soil in a natural way not with too many chemicals (I#41).

Twenty-two participants linked soil improvement strategies as part of their understanding of the term 'sustainable agriculture' (28 references). One of the participants, an NGO official, noted that soil-enriching crops should be reinstated to restore nutritive soil quality: "In the past, some of the crops that we relied on to improve the soil such as *haalhala*[36] are now disappearing" (I#98). A participant commercial farmer concurred with this view when he revealed that he had conducted a personal crusade to keep the traditional crops of the Maldives in production so younger people could learn of their beneficial effects for the soil and for human health (I#88). He added that his actions helped make farming in the Maldives more sustainable.

The practice of bush fallowing was commented upon by eighteen participant farmers (26 references), with one farmer noting: "If the field is getting weak, we have to make a new field but keep on looking after the field we are resting. If we keep changing the fields like this, the soil will continue to be good and we don't need too much fertilizer" (I#21). Thirteen participant farmers linked sustainable agriculture to replacing chemical soil additives with home produced compost (14 references). They noted that this would save farmers money as well as providing peace of mind in knowing that there were no added harmful ingredients. The issue of composting was discussed in greater detail in subcode 7d, *Limited access to farming inputs such as equipment and consumable items such as pesticides, seeds, and fertilizers.*

**Water conservation:** Twelve participants in this research linked sustainable agriculture to having access to uninterrupted supplies of unpolluted freshwater in order to irrigate crops[37] (14 references). Pollution of freshwater reserves was typically linked by participants to either chemical pollution from pesticides and fertilisers, and saltwater inundation of the freshwater lens which increased saline content. In the case of chemical pollution, eight participant farmers argued that large quantities of chemical pesticides and fertilizers used on their island were leeching into the water table. The supporting evidence for this argument centred on periodic inconsistencies in the taste and smell of well water (D#4) (I#36). Although chemical leeching into freshwater reserves posed a significant concern for public

[36] Haalhala (Desmodium umbellatum) is a nitrogen fixing plant commonly found in the southern atolls.

[37] Freshwater is the term commonly used for water that is fit for human consumption and plant irrigation.

health, a participant MoFA official confirmed that there was little testing of soil and water resources for chemical pollution. The official further added that there were no recorded cases of human poisoning caused by chemical pollutants in either soil or freshwater (I#125)

In terms of increased freshwater salinity, five out of six young farmers in a discussion conveyed their understanding for the need to manage freshwater usage in agriculture lest reserves became so depleted that increased water salinity occurred (D#21). The participants noted that they had heard of this type of freshwater pollution on a large agricultural island in another atoll where large quantities of well water were used to irrigate fields. The leader of the discussion noted:

> A team from MoFA went to the island to look at the water because of complaints to the Island Office that farmers were using too much water in their fields. The people complaining said their well water was becoming too salty and could not be used for drinking. Also, I heard it affected the water at the mosque. The water was smelly and tasting a bit salty. Those farmers need to know that it is not sustainable to use water in that way. They have to ration it a bit (D#21).

A participant farmer validated the notion of improved water conservation through drip irrigation when he noted: "I am using drip irrigation in my household garden because it saves water for me, and for all the island. I encourage everyone to come and have a look at my sustainable way of watering. Some farmers come and see, but they do nothing" (I#1). A MoFA official added to this conversation by suggesting that agricultural sustainability resided in a more judicious use of water resources where hydroponic cultivation would replace much of the traditional field farming (I#125).

**Public health:** Nine participant farmers linked the misuse of chemical pesticides and fertilizers to a potential deterioration in human health (15 references). As noted by a participant commercial farmer: "I have read in the papers that people are now getting sick from our local food. They mentioned kidney problems caused by chemical sprays. People will get angry with farmers if this is happening. This is not sustainable for health" (I#109). Similar comment came from another participant farmer who suggested that the rising incidence of cancer in the Maldives was linked to the indiscriminate use of chemicals in local agriculture (I#126). Eight participants in this research further expressed concern that chemical residue from pesticides, both on and in the produce, could be ingested and cause harm to humans (10 references). The belief amongst participants suggested that the perception of indiscriminate chemical usage in food production with the potential of harming public health would incite public anger against farming, thus rendering its continuance unsustainable.

**Environmental protection:** The observation of striking a balance between environmental protection and reduced chemical usage in terms of agricultural sustainability only appeared as a few outlier comments in this research. As noted by a participant agro dealer:

> Sustainable agriculture means protecting the environment. So, we can protect the environment by using smaller amounts of chemicals, and better quality chemicals, together with things like compost. We have to get a balance between natural ways and chemical ways. It cannot all be chemicals (I#107).

In agreement with this sentiment, another participant agro dealer eloquently posited: "I think sustainable agriculture is the agriculture which we can carry out for years and years without disturbing the nature of land, and also the health of the person doing the farming, and the health of the people eating the food (I#101). A participant NGO official noted more bluntly: "I think I will link sustainable agriculture to looking after natural resources. If we don't look after natural resources, then our agriculture is doomed (I#99).

**Subcode 1d: *Sustainable agriculture means enhanced access to land, funding, and farming inputs.***

This subcode comprised commentary from twenty-six participants (32 references) and was divided into three main sections: land; funding; and, technical knowledge and farming inputs.

**Land:** A shortage of available farming land was observed by five participant farmers (7 references) as a constraint to sustainable agriculture. One of the farmers noted: "We don't think we can have sustainable agriculture in Maldives because we don't have enough land. Other countries have more land than us like Sri Lanka. They are a farming country, we are a fishing country with a lot of sea" (D#10). Adding to this sentiment, a participant cooperative committee member noted: "Sustainable agriculture means we need the bigger land and then we can do more farming." (I#14).

Ten participant farmers noted that access to land, rather than its availability, was the main land issue in the Maldives (12 references). They asserted that there was sufficient agricultural land, but its distribution and tenure arrangement differed between islands depending upon an island council land policy (D#8). Expressing frustration over the ad hoc farm land distribution in inhabited islands, the leader of a discussion with ten participant farmers noted:

> The farmers need written down agreements in the proper way with the Island Office or Ministry to say the terms and conditions for having the land. This way he knows what the rent is, how long he can have the land, and what he is allowed to do with the land. We

> cannot have the old system anymore where one friend in the Island Office says you can have this and that land by only speaking (D#8).

Agreeing the preceding sentiment, another participant farmer added that improved tenure agreements would bolster motivation towards sustainability in agriculture through land stewardship where farmers would look after land that they felt ownership of, albeit for a prescribed period of time. The farmer noted:

> The lease on the land should be up to twenty-five or fifty years like with commercial agricultural islands. If I only get a few years, then I will use a lot of chemicals to get the most out of that land in a short time. If I get a longer lease, then I will look after the soil and other things because this will help my crops (I#133).

MoFA agreed that the allocation process for agricultural land by island councils differed between islands. However, they noted that island councils were in a better position to appreciate local sensitivities that may arise in land distribution such as familial claims on certain trees, water wells and so forth. They added that the distribution of agricultural land by island councils would be preferable to a centralised agricultural land distribution policy as there would be less likelihood of land disputes (O#139).

**Funding:** Whilst the issue of funding was not widely linked to sustainable agriculture, one member of a discussion with nine participant woman's development committee members noted: "The thing we don't have is money. Without funding, we can't continue with farming, and so it is not a sustainable activity for us" (D#27). Offering a solution to funding shortages, a participant commercial farmer noted that institutional lenders should be obliged to commit a percentage of their lending book to agriculture in order to assist agricultural sustainability (I#115). Further comment from a participant commercial farmer / food distributor noted that the only way to sustain agriculture in the Maldives was for government to provide financial incentives, such as low interest loans and farming input subsidies (I#110). An outlier remark from a participant schoolteacher farmer was cautious in supporting financial incentives from the state lest they mask unsustainable farming activity. He noted: "We should not be using the subsidies given by the government in order to cover the costs of farming if it is unsustainable in the first place." (I#41). The issue of funding shortages in agriculture was more widely discussed in subcode 7g, *Poor access to funding restricts farming.*

**Technical knowledge and farming inputs:** Six participants in this research linked poor access to technical knowledge as impacting negatively upon efforts to build sustainable agriculture (8 references). In a discussion with five participant farmers on the difficulty in sourcing advice on pest intrusion, one of the participant farmers explained: "We listen to the farming radio

programme, and MoFA comes here for short visits with a team of experts to try and help. But we need more advice to help us make sustainable farming. MoFA need to stay on our island longer to help us" (D#4).

A more general castigation on limitations of MoFA assistance in promoting agricultural sustainability came from a participant farmer when he noted: "The government are not giving any aid or any help or equipment. They are not thinking about these farming people…if we want to sustain the agriculture in the Maldives, the government must really care about these people" (I#2).

**Sub code 1e: *Little or no knowledge of the term 'sustainable agriculture', and it doesn't exist in the Maldives anyway.***

This subcode comprised commentary from eighteen participants (19 references) and was divided into two main sections: what is sustainable agriculture? and, there is no sustainable agriculture.

**What is sustainable agriculture?** Fifteen participants in this subcode commented upon their lack of familiarity with the term 'sustainable agriculture' (17 references). A participant farmer commented that she had not heard of the word 'sustainable' or any Maldivian equivalent (I#45), and a further three participant farmers noted they did not understand what the word 'sustainable' meant (I#94). A participant in a youth group discussion further commented: "I never heard that word together with agriculture" (D#13), and one participant commercial farmer noted: "I have heard of this word sustainable, but it's used very rarely" (I#133).

**There is no sustainable agriculture:** Five of the eighteen participants contributing to this subcode did not believe there was, or could be, sustainable agriculture in the Maldives mainly because there were certain goods such as the staples of flour, rice and sugar that would always have to be imported (7 references). Following on from this sentiment, a participant resort manager noted that Maldivian farmers should rather offshore their production to Sri Lanka and supply the staples back to the Maldives. He contended this would result in sustainable agriculture for the Maldives rather than sustainable agriculture in the Maldives (I#105). Summing up the reticence surrounding the prospect of attaining a higher level of agricultural sustainability in the Maldives, a participant cooperative member noted: "Other countries can try sustainable farming, but here we cannot go ahead with that. We cannot sustain ourselves with what we grow" (I#70).

Countering the negativity of achieving higher levels of sustainable agriculture, a participant school principal noted that the Maldives had always had sustainable agriculture, as its activity had provided sustenance throughout generations. He noted:

> Since before the time of Ibn Battuta, we were producing food on our islands, and getting other food from visiting ships from other countries. We were growing what we knew how to grow, and we also tried other crops. Sometimes they worked and sometimes not, but we kept on going. This makes our agriculture sustainable (I#41).

**Subcode 1f: *'Sustainable agriculture' means the acquisition and use of knowledge in agriculture.***

Commentary contributing to this subcode came from fourteen participants (27 references) and was divided into two main sections: teaching agriculture in schools; and, parents and elders sharing knowledge.

**Teaching agriculture in schools:** Within this subcode, twelve participants observed that the main reason there was a lack of sustainable agriculture in the Maldives was due to a lack of agricultural learning in schools in order to incentivise students into farming (14 references). In addressing the agricultural knowledge deficit amongst the young, the participant manager of a commercial agricultural island noted that technology could play an incentivizing role for students to participate in agriculture and so make its activity sustainable. He noted:

> If you want to have a sustainable agriculture, the first thing is to teach students agricultural science at the very young age, and how agriculture uses technology like hydroponics and greenhouses. This will be very attractive and fantastic for students because they will learn that agriculture needs training and skills and is not just digging in the fields (I#97).

The significance of teaching agriculture as a subject in a school environment in order to promote sustainable agriculture was reiterated by a participant agro dealer when he noted: "We used to study a subject called fishery science when I was at school, and this was for sustainable fisheries. We should also do this for agriculture in the schools" (I#107). In agreement with this comment, a participant school principal commented: "If we want sustainable agriculture, we have to teach it through the curriculum. So, I hope that the new curriculum is going to bring the big change (I#61).

**Parents and elders sharing knowledge:** In spite of the dearth of agricultural teaching in schools, a participant school principal noted that the transfer of agricultural knowledge to young people could come from their farming parents. She went on to recount her own experience:

> I have learnt farming because I went to the farm with my mother and she told us about caring for the plants, looking after the soil, and what medicine to give. So, parents do not do that so much today because children don't always want to go to the farm (I#61).

In a discussion with six participant young farmers, they noted that older farming friends would pass on agricultural knowledge to them (7 references). One young farmer noted: "Of course we are young farmers, and we can get information about chemicals and other things from the older ones. They have been doing farming for a long time, so that means the farming must be sustainable, right?" (D#21). And a final comment from the same discussion noted: "We need more information about this farming so we have interest to do it better and keep it going" (D#21).

## Code summary

Box 1 presents the key points to emerge from Code 1, *'Sustainable agriculture' means: profitable farming over a long period; soil and water conservation; and, stable links to the market.*

**Box 1. Key points from code 1.**

- The strongest association with the term 'sustainable agriculture' was profitability in farming. Participants understood that stable markets, expanded production assisted by technology, and a reduction in the quantity of imported food, would increase agricultural profitability.
- Sustainable agriculture was regarded as being a 'long-term' 'continual' activity with a timeframe ranging from three to thirty years.
- Sustainable agriculture was understood as reducing environmental pollution and harm to human health from the misuse of chemical pesticides and synthetic fertilizers.
- Sustainable agriculture was understood as promoting land stewardship where natural resource conservation of water and soil were priorities.
- Sustainable agriculture was linked to improved land tenure agreements for farming plots on inhabited islands, improved access to institutional funding, greater technical assistance from MoFA, and improved input supplies.
- Sustainable agriculture was not a term familiar to some farmers, and sustainability was not commonly associated with agriculture.
- The acquisition of agricultural knowledge through secondary education, and through parental and elders' knowledge transfer, was regarded as essential in promoting sustainable agriculture.

**Code 2** **'Building capacity in agriculture' means acquiring agricultural knowledge and enhancing access to resources in order to increase production profitability.**

**Table 6. Code 2.**

***'Building capacity in agriculture' means acquiring agricultural knowledge and enhancing access to resources in order to increase production profitability.***

| Code: 2 | Sub code: 2a, 2b, 2c. | | No. of participants | No. of references |
|---|---|---|---|---|
| ***'Building capacity in agriculture,' means acquiring agricultural knowledge, and enhancing access to resources in order to increase production and profitability.*** | 2a | *'Building capacity in agriculture' means increased profitability derived through enhanced production assisted by improved access to infrastructure, farming inputs, technology, technical knowledge, and funding.* | 52 | 65 |
| | 2b | *'Building capacity in agriculture' means the acquisition and use of knowledge in agriculture.* | 29 | 38 |
| | 2c | *'Building capacity in agriculture' means moving towards a more positive image of agriculture.* | 8 | 10 |
| | | ***Total:** * Any individual participant may have mentioned a theme more than once (or) on multiple occasions during the interview/focus group.* | **89** | **113** |

## Code introduction

Despite the term 'building capacity in agriculture' resonating far less with participants than the term 'sustainable agriculture', participant responses for this code indicated that, like the preceding code, the generation of profit was at the core of participants' understanding of building agricultural capacity. However, the difference with this code was its focus on enhanced access to farming inputs such as technical knowledge, technology, and funding to build profitability, rather than such factors as controls on imported food items.

### Subcode 2a: *'Building capacity in agriculture' means enhanced access to resources leading to increased production and thus profitability.*

The commentary contributing to this subcode came from fifty-two participants (65 references) and was divided into four main sections: increased production and profitability; enhanced access to infrastructure and farming inputs; enhanced access to technology and technical knowledge; and, enhanced access to investment and loans.

**Increased profitability derived from enhanced production**: Twenty-seven participants linked increased crop production and profitability to building agricultural capacity (31 references). As noted by one participant farmer representing this widely held view: "Building capacity is increasing crops and profits for the farmers. Simple as that!" (I#69). A participant cooperative official added his own example of this understanding when he noted: "We can

build capacity, and I can expand and grow up to 1,000 chillies, and I will get 20,000 rufiyaa each month from that. So, more production makes more profit" (I#26).

**Enhanced access to infrastructure and farming inputs:** Seventeen participants commented on building agricultural capacity through enhanced access to infrastructure and farming inputs (19 references). A discussion with four participant farmers reflected a widely held view amongst participants in this section that the poor island electricity distribution hindered agricultural sustainability 5 references). One participant summarised this sentiment when she noted "There are areas of the island that we can use for farming, but there is no power connection available. Government should provide this if they want sustainable farming in this country" (I#21). A participant food and beverage manager from a resort agreed with the need for improved electricity and other infrastructure in building agricultural capacity when he noted "So you have to build up the infrastructure on the islands, like power, desalinated water, and good harbours, in order for farmers to increase their output, and supply more customers" (I#136).

In a discussion with six participant farmers, five farmers noted their interpretation of building capacity in agriculture to be the provision of inexpensive, good quality inputs (7 references). They noted that as most inputs were sourced from Male', they incurred a high transportation cost, were of indeterminable quality with little recourse if the inputs were of substandard quality (D#2). In a further discussion with five participant cooperative members the high cost of fertilizers and pesticides was noted along with the lack of available farming equipment on their island (5 references) (D#9).

**Enhanced access to technology and technical knowledge:** Fifteen participants observed that building agricultural capacity was dependent upon enhanced access to technology and technical expertise, most commonly associated with greenhouses with hydroponic Autopot[38] plant feeding systems 19 references). Articulating the significance of technology driven greenhouses, a participant MoFA official noted:

> For building agricultural capacity, I think one very basic structure is the greenhouse itself. I mean a lot of farmers are not very familiar with the greenhouse production or the Autopot system. But it is something that the government has been doing with the UN farming projects. Farmers will feel they will give better products to resorts by using this technology (I#129).

[38] Autopot are self-watering hydroponic systems utilizing gravity feed as opposed to pumps. In the Maldives, most Autopot systems were sourced from Malaysia as part of the UNDP's Support to Integrated Farming project.

A farmer/civil servant participant added his support of greenhouse cultivation when he noted: “Modern agricultural systems means using some greenhouses and Autopot. We can grow all the year round in the greenhouses, and it protects against the storms and the pests” (I#50). A discussion with six young farmer participants added that foreign or outside technical expertise was required in teaching farmers how to optimise greenhouse production (7 references) (D#21). One of the young farmer participants noted: “We had some foreign experts here after the tsunami to show us how to build and run the greenhouses. They were very good because they stayed with us on the island to teach us” (D#21). Only four participants associated capacity building in agriculture with the use of alternative technology which they understood as the utilisation of solar panels for providing power, and composting for providing fertilisers (4 references).

**Enhanced access to investment and loans:** Twelve participants noted that their understanding of building agricultural capacity related to improved access to funding whether through loans, investment, and in some instances government assistance (16 references). In a discussion with five participant farmers, one commented: “Farmers need some money to build up their farms. We cannot get this through the banks as they won’t lend to farmers, so we need other places to borrow” (D#9). Following on, another participant farmer noted: “Building capacity means having enough money to do farming” (I#46).

Two participant farmers/island officials explained how funding shortages adversely affected cash flow and sometimes led to farm closures. One of the farmers relayed his personal experience of how his efforts to build his agricultural capacity had been thwarted by poor cash flow: “After two years we had no funds for running the farm, so we had to stop farming. If we could have got a small loan to get us through we could have survived, but nobody will give, so the farm is finished for now” (I#18). A further comment from a participant commercial farmer noted that lack of investment in farming eroded people’s confidence in farming:

> I think the biggest bottleneck with agricultural capacity is confidence; people don't have confidence in agriculture because of not being able to borrow the money. This also means nobody wants to invest seriously in agriculture. So, we are not building capacity in agriculture with this situation (I#102).

**Subcode 2b:** ***'Building capacity in agriculture' means the acquisition and use of knowledge in agriculture.***

The participant meanings contributing to this subcode were similar to many of those meanings contributing to the preceding subcode 1f. However, in this subcode participants believed their meanings were a better fit with the term 'building capacity in agriculture', than the term 'sustainable agriculture'.

This subcode noted commentary from twenty-nine participants (38 references) and was divided into two main sections: education and training for students and youth in farming; and, poor knowledge of chemical pesticide and fertiliser use.

**Education and training for students and youth in farming**: This section revealed that participants believed agricultural learning should begin in schools in order to build agricultural capacity (15 participants, 22 references). As noted by one participant MoFA official working with the development of cooperatives: "To build capacity in agriculture, we have to teach it in schools so kids get to know farming, and like it from a young age. This will give students some other job to think about for work in the future" (I#53). A participant school principal elaborated on the significance of knowing what to do in farming when she noted:

> You have to have some knowledge to find out what will grow and what will not, what to throw out and what to keep, and how to measure things correctly like medicine. You should get this knowledge from the school. This will build your capacity to understand how agriculture works correctly (I#113).

Commentary from two participant cooperative members noted that it was not just school children that needed to build their understanding of agriculture, but also unemployed youth that had left the school system. One of the members noted: "Building capacity means giving the young people some knowledge about farming so they can stop just roaming about the island doing nothing. They need to know about farming so they can do that farm work during the day" (I#81). A participant NGO official and farmer observed that building capacity in agriculture should be directed to all ages when she noted: "I think capacity building means giving all age farmers the information and knowledge for farming. We should build up the strength of all farmers together" (I#99). A final comment in this section came from a participant cooperative member in a discussion with thirteen other participant cooperative members, when he noted that building capacity in agriculture on his island had come from an outside expert. He noted: "An outsider came to the island for two or three months to show us the best way you can grow crops like watermelon. During his visit, many people

became interested in agriculture that were not interested before. This is what building up capacity in agriculture means to me (D#17).

**Poor knowledge of chemical pesticide and fertiliser usage:** Ten participants noted their understanding of building capacity in agriculture as being in possession of the correct knowledge for the utilization of pesticide and fertilizers, particularly in deciding appropriate treatment, correct dosage and application, and storage in hot conditions (12 references). In a discussion with five participant resort agricultural workers, the chief horticulturalist commented: "Farmers don't have the right information about using fertilizer and chemicals in the Maldives…sometimes they burn the plants because they are using too much chemical" (D#26). A participant agro dealer observed that the indiscriminate use of pesticides and chemicals was now of concern to public health: "Nowadays, the people are getting more aware of health problems from chemicals on plants because they don't want to get sick. So, building capacity or knowledge in agriculture will provide more information to stop the wrong chemicals being used" (I#101).

**Subcode 2c: '*Building capacity in agriculture' means moving towards a more positive image of agriculture.***

Analysis of the subcode noted eight participants believed negative attitudes surrounding farming should be changed as part of building capacity in agriculture (10 references). A participant farmer from a large agricultural island commented upon the negative image of farming as it was associated with losing money. She noted: "We have to change the minds of people and make them aware that farming can produce things that can make them money" (I#21). A participant farmer who was also an NGO official repeated this theme when he commented: "To change people's minds about agriculture, they have to believe that it is a good job, not a poor job, and it can be sufficient for your living. That kind of thinking we need" (I#71).

A participant general manager of a resort observed that leadership and self-help in farming could help to assist in dispelling the negative connotations and build agricultural capacity. He explained: "To build capacity in agriculture, you need leaders who are willing to do the hard work. They need to set an example of working hard, and showing others that farming is not just a hobby but can be a good business" (I#105). Self-help and confidence in one's own farming ability was highlighted by a participant MoFA official who observed that MoFA sometimes induced a dependency culture amongst farmers where they waited for direction

and assistance with issues they had the capacity to deal with themselves: “We see farmers relying on MoFA to provide solutions to their problems when they probably know as much as we do. It’s a habit for farmers to call MoFA and expect a visit. I think they lack confidence in their own ability (I#125).

A final comment on the term ‘building capacity in agriculture’ came from another participant MoFA official who noted that farmers needed to communicate their positive farming experiences to each other, and the wider public: “We need a common platform where farmers can talk about the good things they experience in farming. This will get into other people’s minds and encourage them to farm. More farmers farming in this country will build agricultural capacity” (I#53).

### Code summary.

Box 2 presents the key points to emerge from Code 2, *‘Building capacity in agriculture’ means improving access to resources, including knowledge, in order to increase production, and portray agriculture as a viable employment opportunity.*

**Box 2. Key points from code 2**

- The strongest association with ‘building capacity in agriculture’ related to increased production generating increased profitability. Increased production would be assisted by improved access to resources such as infrastructure farming inputs, technology and funding.
- The acquisition of agricultural knowledge was noted as integral to building capacity in agriculture.
- Changing the negative attitude of farming to one where its potential benefits were highlighted.

## 4.4. Chapter summary

Both codes in this chapter assisted in establishing the participants baseline understanding of the terms ‘sustainable agriculture’, and ‘building capacity in agriculture’. Participants’ understanding of the terms was rooted in the notion that agriculture had to be profitable in order for it to continue over a long period of time. Participants implied that it was this notion which best represented their understanding of sustainability in agriculture.

Assisting the continued profitability of agriculture, participants noted that enhanced access to technology, knowledge, funding, and farming inputs, would expand local productive capacity and thus lessen the reliance upon imported food. In many instances, imported food

flows were regarded as causes for shortages and gluts which resulted in price volatility. Participants further contended that more judicious land stewardship would benefit the farming environment as pesticide and fertiliser pollution would be minimised.

The participant responses in understanding the terms ‘sustainable agriculture’, and ‘building capacity in agriculture’ can be summarised where factors such as expanded productive capacity led to profitability which provided financial sustainability.

# Chapter 5. Findings (2). The key factors encountered by farmers in the Maldives

## 5.1. Chapter introduction

Chapter five presents the data collected from participants in this research relating to the second supporting question:

- *What are the key factors encountered by farmers in the Maldives?*

In the preceding chapter four, participants in this research linked their main understanding of the terms 'sustainable agriculture' and 'building capacity in agriculture', to profitability in their farming activities over a long period of time. Participants believed profitability would be fuelled by enhanced productive output achieved through improved access to infrastructure, farming inputs, technology, technical knowledge, and funding. Enhanced output would then benefit from stabilised markets where the majority of the farmers output was purchased at a price which returned a profit to the farmers. Participants further viewed stabilised markets as being unfettered by high levels of food imports. Enhanced productive capacity generating a profit was then at the core of participants' understanding of building agricultural capacity through sustainable means.

In this chapter, participants commented widely on key factors that influenced the building of agricultural capacity in order to generate a profit. While this commentary did not always link profitability to sustainability, the responses implied that only through profitability would agriculture continue over a long period of time, and thus be sustainable.

Analysis of the data contributing to this chapter resulted in thirty subcodes which were condensed in to seven codes. The codes in this chapter were presented in an order that best reflected the unfolding farming story in the Maldives, rather than a chronological order based upon the highest numbers of participant responses.

## 5.2. Coded data

**Code 3.** **People farm primarily to make a profit.**

**Table 7. Code 3.**

***People farm primarily to make money.***

| Code: 3 | Subcode: 3a, 3b, 3c, 3d. | | No. of participants. | No. of references. |
|---|---|---|---|---|
| ***People farm primarily to make a profit.*** | 3a | *Understanding profitability in farming.* | 121 | 150 |
| | 3b | *Record keeping.* | 31 | 37 |
| | 3c | *Profitability and trust.* | 25 | 27 |
| | | ***Total:**<br>* Any individual participant may have mentioned a theme more than once (or) on multiple occasions during the interview/focus group.* | **177** | **214** |

### Code introduction

Code 3 noted the main driver for people engaging in farming was to make a profit. While other motivations were evident such as providing household food, and undertaking farming as an enjoyable social activity, participants implied that they would be unlikely to undertake farming activity if they were losing money. A smaller number of farmers noted that they would desist from farming if they were only breaking even, noting that they were prepared to expend effort and resources to generate a profit, but not to simply cover expenses. In establishing profitability, the accounting practices of farmers ranged from fastidious attention to detail, to an anecdotal recall of expenses incurred. Threats to profitability mainly focussed on issues of mistrust in others handling farmers' money as opposed to issues of risk and loss.

**Subcode 3a:** ***Understanding profitability in farming.***

Almost a third of participants contributing to this research expressed an understanding of profitability in their interview and discussion responses (121 participants, 150 references). Participants reported that 'making money' or 'getting a better income' was the main driver for engaging in farming activity in the Maldives (99 participants, 120 references). Both phrases conveyed the understanding of profitability in farming where income exceeded expenditure, and a financial surplus was evident. In a discussion with five participant farmers on a large agricultural island, one farmer succinctly summed up the priority of making money from farming when he noted: "Farming is not for a hobby, not for anything else, but just for making money" (D#10). A further comment from one of four participant Bangladeshi

agricultural labourers noted: “Farming is profitable for us on this island. We cannot get such a good opportunity in Bangladesh. We can make more money here” (D#14).

The level of profitability was commented upon by participants mainly using words relating to physical size. Twenty-seven participant farmers referred to ‘less’, ‘little’, and ‘low’ profitability (35 references), while twenty participants noted ‘more’, ‘big’, and, ‘high’ profitability (22 references). Numerical references to profitability were also noted as in the case of a participant commercial farmer who explained that household garden farmers could generate up to MVR500 ( 25) per day in profit when their fruit trees were being harvested (I#102). Another participant farmer/teacher added that he achieved 35% profit on a monthly turnover of MVR100,000 ( 5,000) (I#76). A participant husband and wife farming couple recounted the profitability of their farm in reference to the accumulation of assets rather than financial status. They recalled that they only had a small patch of land when they started farming, and now had five fields, one shop, a motorcycle and a pickup truck, which demonstrated the profitability of their farm (I#93).

Discussion of profitability also came from the nine participant agro-dealers, and the fourteen participant food traders in this research, who noted their business of trading farming inputs, and food produce respectively, were profitable. Indeed, most were curious as to why I would think that they would engage their time and effort in an activity that was not profitable! (O#150). The thirteen participants attached to commercial farming in this research were typically noncommittal in commenting about profitability (O#150), as where participant cooperative members; one had the feeling that the former were concerned about profit disclosure, and the latter were simply unaware of their profitability status (O#150).

The issue of breaking even was not considered as acceptable by the eight participant farmers that commented on this issue (10 references). Their rationale contended that considerable time, effort, and resources were required in farming operations, which should be rewarded through the generation of profit. As noted by one participant youth farmer: “We do this farm work to make the profit, not to stand still and be the same. We need the profit to go forward” (I#54).

**Loss:** Reference to financial loss was mainly in general terms where farming was perceived as loss making. Twenty-two participants referred to the words ‘unprofitable’, and ‘loss’ in respect of their general view of farming (29 references) and one participant farmer noted:

"Farming can give a good life, but also be unprofitable if you don't take care. Losses can come quickly, so the best way is to look after the farm everyday" (I#50). Financial loss was also mentioned in following codes, particularly in reference to inclement weather and pest intrusion damaging crops, and poor market connectivity to producer markets.

**Subcode 3b: *Record keeping.***

Thirty-one participants in this research conveyed responses with reference to record keeping within farming activity (37 references). Of this, twenty participants noted they kept accurate records of income and expenditure (24 references), and eleven participants noted their record keeping was a more casual undertaking in order to provide an approximate indication of viability (13 references). In commenting on record keeping in the production process and its link to profitability, one participant farmer noted: "We keep all records of what chemicals and fertiliser we use, and what makes the plants grow well. This way we know our money situation" (I#115). A participant young farmer added that he kept records as he needed to know that his farm was profitable so he wasn't wasting his time farming (I#56), and a farming participant farmer/teacher further noted despite keeping accurate farming records, he did not include any cost for his time and labour as he farmed for enjoyment (I#42). Despite the profession of commitment to record keeping from participants, some such as cooperative administrative staff appeared less sure of their capacity to record data. They noted their unfamiliarity with accounting software packages, and power outages in operating computers (O#180).

Participant MoFA officials expressed their reservation regarding the diligence of record keeping amongst farmers, noting that while farmers may have kept some rudimentary notes of costs incurred, such notes were often mislaid, and rarely analysed to ascertain profitability (O#150). A participant MoFA official further noted that as most subsistent and semi-subsistent farmers were not required to file accounts or tax returns, accurate records assumed less significance (I#53). However, participant MoFA officials did acknowledge that if farmers had borrowed money from friends and family in order to invest in their farms, the lenders would probably insist on seeing an itemised income and expenditure statement on a regular basis as a form of security for their lending (O#150).

**Subcode 3c:** ***Profitability and trust.***

Twenty-five participant farmers linked profitable farming to issues of trust where farmers relied on cooperatives and produce traders to give farmers fair prices when purchasing the farmers produce (27 references). However, many participant farmers noted that they sometimes mistrusted both cooperatives and produce traders to provide fair market prices and accused both parties of profiteering at the expense of farmers (O#173). Participant farmers further noted that both parties could often not be trusted to pay farmers on time for the produce they had taken (O#173). A participant farmer/restaurateur extended the notion of mistrust to include other farmers when he discussed his preference for farming by himself or with family members, rather than farming in groups with people he was unfamiliar with: "Farmers do not see how they can work together for money. They will not trust each other with money, and they will not make profit from farming with others" (I#37).

## Code summary

Box 3 presents the key points to emerge from Code 3, *People farm primarily to make a profit.*

**Box 3. Key points from Code 3**

- **Making profit**: Generating a profit was the main motivation for entering farming. Breaking even was considered unacceptable. Farming had to be well managed in order to avoid financial losses.
- **Record keeping:** Record keeping was widely practiced by participant farmers although the accuracy of the records was questioned by MoFA.
- **Trust:** Many participant farmers mistrusted food traders and cooperatives to give fair market prices for produce, and to pay farmers on time. Farmers also mistrusted working with other groups of farmers particularly in handling money.

**Code 4** **Farm labour mainly comprised individuals within family farming units assisted by migrant workers.**

**Table 8, Code 4.**

***Farm labour mainly comprised individuals within family farming units assisted by migrant workers.***

| Code: 4 | Sub code: 4a, 4b, 4c. | | No. of participants | No. of references. |
|---|---|---|---|---|
| ***Farm labour mainly comprised individuals within family farming units assisted by migrant workers.*** | 4a | *Women and male migrant labourers perform most of the agricultural labouring.* | 85 | 184 |
| | 4b | *Formalised collective farming activity through such entities as cooperatives does not fit easily within island communities.* | 78 | 129 |
| | 4c | *Individuals and families are the preferred farming unit.* | 56 | 78 |
| | | ***Total:** * Any individual participant may have mentioned a theme more than once (or) on multiple occasions during the interview/focus group.* | **219** | **391** |

## Code introduction

This code revealed that the labour force sustaining farming activity in the Maldives comprised mainly migrant workers from Bangladesh with or without agricultural experience, and Maldivian women within family farming units. Maldivian men provided labour to a lesser degree in smaller farming operations where physical strength or management functions were intermittently required, and in larger farms where they acted in management roles for the entire farming operation. The majority of participant farmers in this research preferred to farm individually within a family farming unit, assisted by migrant labour. Farmers were less enthusiastic about joining collective farming structures such as cooperatives whose collectivisation appeared at variance with traditional individualistic farming practices.

**Subcode 4a:** ***Women and male migrant labourers are the main farmers in the Maldives.***

Eighty-five out of 373 participants in this study believed that women and male migrant labourers, mainly from Bangladesh, were the main people to engage in farming activity in the Maldives (184 references).

**Women in farming:** Analysis of the participant data revealed that the average age of women farmers in the Maldives was mid to late forties with ages ranging from the early thirties to mid-sixties.

Sixty-four participants in this study believed more women were engaged in more farming activity than Maldivian men (71 references) where they undertook manual labouring which included: digging, clearing, watering and so forth, and were more likely than men to perform such tasks in groups based on friendship (O#139). A participant guesthouse chef noted: "When I go past the fields, I see the women either in groups or alone doing all the work. No sign of the man. The women are doing everything" (I#82). Eighteen participant farmers noted that women were particularly active in the planting of watermelon for the Ramadan period (22 references), and were more likely to tend livestock, particularly poultry. A participant expatriate consultant noted: "Women are much cleaner for dealing with the poultry hygiene and bio-security. It is difficult to get men to bother about these things, but the women understand it is important" (I#85).

**Women in farming cooperatives:** Analysis of the data revealed that of the thirty-eight participant cooperative members interviewed in this research, twenty-six members were women, and four out of the six cooperatives visited estimated that their female membership averaged 70% of the total membership (O#121). A participant MoFA official commented that in the case of the Fisheries and Agricultural Diversification Project (FADiP) assisted cooperatives, a majority of women members were required in order to access assistance, hence the high female membership in the FADiP cooperatives. The official further noted that one of the objectives of the FADiP intervention was to promote women's participation in agriculture beyond that of a labouring role: "We want women who are labouring on farms to also be the decision makers on how the farms are run" (I#129).

**Women as farm managers:** In an interview with a participant farmer on a large agricultural island, he noted that women had advanced beyond labouring activity on their farms and were now managers of the farms: "We have women managing farms on this island. They hire the Bangladeshi labour to do the work and set the selling price at the market. They are the bosses of their farms" (#12). Reinforcing the desire to build the managerial capacity of women in agriculture, a participant MoFA official noted: "Women are the main farmers in Maldives, and if they had more technical knowledge on how to do better farming, they could industrialise agriculture in this county. They could make it like the fisheries sector." (I#10).

**Maldivian men in farming:** Eighteen participants in this research believed that Maldivian men were the main farmers doing most of the farming work in the Maldives (22 references). However, forty-eight participants noted that men would rather be engaged in fishing than

farming on their islands (56 references). In spite of the preference for fishing, men who were resident on their island and not part of the migrant labour flow to resorts and Male', often assisted their wives with heavy lifting work on the field plots, and in negotiating purchases of farm inputs and sales of produce to the market (I#10). Twelve participant farmers added that older retired couples often farmed together sharing all tasks. They continued that men also tended to manage larger more commercialised farms supervising migrant labour and acting as interlocutors with factor and producer markets (14 references). In the case of commercial farms located on separate islands, it was noted that Maldivian men would be employed in supervisory roles over migrant labour. Women would not occupy such positions as it would be culturally inappropriate for them to be away on separate islands without their husbands and families (O#94).

**Migrant workers in farming:** Data contributing to this subcode indicated that male labourers from Bangladesh, and to a lesser extent, south India, performed the majority of manual agricultural labour in the Maldives (65 participants, 74 references). Indicative of this labour function sustaining Maldivian agriculture was a comment by a participant island council president: "Without Bangladeshi farm labour, the farming on our island would be sunk. We have nearly 370 Bangladeshis on our island and most of them are involved in farming work. We rely on them" (I#40). Reinforcing the significance of Bangladeshi labour, a participant commercial farmer noted: "We have twenty-six Bangladeshis doing the labour, and four Maldivians doing the supervising on the farm. We also have one Sri Lankan cook. Even smaller field plots will have one or two Bangladeshi labourers to help out" (I#130).

Hard workers, value for money, and inherent agricultural knowledge: Fifty participant Maldivian farmers acknowledged that Bangladeshi labourers were hard working, possessing some agricultural knowledge, low cost, mostly reliable and honest, and in some cases, very enterprising (61 references). In a discussion with ten participant farmers on a large agricultural island, one farmer summed up the labour functions of migrant labour in agriculture when he noted:

> The labourers usually work a twelve-hour day from 6 a.m. to 6 p.m. They are obedient in following instructions, and only become excitable if they are fighting with each other. We give the instructions in the morning, and then we go to the fields in the evenings and discuss the day's work with them. We cannot get Maldivians to do the same work. Bangladeshis are more suitable for farm work than Maldivians, and they are cheaper (D#8).

A participant commercial farmer added that he would have to pay one Maldivian staff between MVR8,000-9,000 ( 400- 450) per month which would cover the salaries for five Bangladeshi workers per month (I#102).

Thirty-two participants further noted that labourers were generally in possession of limited agricultural knowledge, which was confined to field clearing and a rudimentary understanding of planting and harvesting, but not extending to the use of irrigation equipment, and pesticides (38 references). In a discussion with seven Bangladeshi labourers, five noted that they knew far more about growing plants than their Maldivian managers and were happy to share this knowledge with them (D#22). However, one participant Bangladeshi labourer noted that sometimes they were told to not to deviate from the instructions they had been given from the Maldivian farm owners (I#17). One extremely vocal participant Bangladeshi labourer insisted on the having the last word on this subject when he noted: "We are working nicely with Maldivian farmers, and they are with us too. But they just come to the fields sometimes, and then go. They are not feeling the growing in the fields like we are" (D#22).

Entrepreneurship. Seventeen Maldivian participants in this study noted the strong entrepreneurial spirit that was evident in some of the Bangladeshi farm labourers as they rented field plots from farmers to grow and sell their own produce in the Male' market (23 references). In a discussion with six participant Bangladeshi fruit and vegetable sellers in the Male' market, they noted that Bangladeshi boat crews would often buy produce from Bangladeshi and Maldivian farmers when their boats visited islands, and then sell the produce to Bangladeshi fruit and vegetable sellers renting Maldivian owned stalls in the market (D#24). Commenting on entrepreneurial capacity of the Bangladeshi community in trading agricultural produce, a participant MoFA official noted: "Although I want more Maldivians to farm, I do say the Bangladeshis deserve their money because they work hard, and they keep local farming going on" (I#120). The MoFA official added that the high level of connectivity between the Bangladeshi community producing and trading agricultural produce was facilitated by the excellent mobile phone coverage in the Maldives.

A more negative commentary on the Bangladeshi dominance of agricultural trading was made by a participant agro dealer who recounted the complaints of his Maldivian farmer customers regarding the Bangladeshi pricing cartel that appeared to exist in the Male' market. He noted that his customers believed the prices paid to farmers were kept artificially low by the pricing cartel (I#101). He explained his thoughts on why this situation

was arising: “Honestly I have to say, even though I am a Maldivian, the reason the Bangladeshis are so strong is because we are lazy. We will not do the farming or selling work in the market, but instead we just sit in a café drinking coffee and talking. This is the truth (I#101). A participant MoFA official commented that even when there was a crackdown on undocumented labour, of which much was agriculture based, there was no discernible increase in agricultural labouring by Maldivians, but rather the formulation of mechanisms to circumvent the crackdown (I#53).

One of four participant Bangladeshi labourers in a discussion explained their entrepreneurial capacity in cultivating crops and selling them in the market place: when one summed up:

> We come to work in this country because we are poor and need money for our families. We do not know what work we will be doing until we get here. It is good if we know about farming and are sent to a farming island. We can grow the crops even though the costs for seed and chemicals to kill pests are high in this country. And we can sell in the market and make good profit. We know how to do this work in Bangladesh, so we can do it here and send the money back to our families in Bangladesh (D#14).

**Subcode 4b: *Formalised collective farming activity through such entities as cooperatives does not fit easily within island communities.***

**Cooperatives are an inappropriate model for island farming:** Seventy-eight out of 152 participant farmers expressed scepticism over formalised collective farming activity, particularly in the area of production where individualistic and family farming was the norm. Reserve was further directed by the participants towards collective farming entities that were legally enshrined, and accompanied by prescribed operating practices, such as in the case of cooperatives which operated under the Cooperative Societies Act of 2007 (129 references). Twenty-five participant farmers further expressed the belief that producer organisations such as those promoted through MoFA’s 2009 Post Tsunami Agricultural and Fisheries Rehabilitation Programme, and cooperatives as promoted in MoFA’s 2011 Fisheries and Agricultural Diversification Programme, simply did not fit within the sociocultural construct of small island communities where the main farming vehicle was the family unit (37 references).

Commenting on an example of the unsuitability of the cooperative model for island agriculture, a discussion with five participant farmers revealed that MoFA had previously tried to introduce cooperatives to their island through a yearlong pilot project (D#4). In summing up the projects failure, a participant ex-commercial farmer noted that farmers would always welcome new MoFA initiatives and would usually support them through the

pilot phase. However, when the MoFA support ceased, the projects tended to limp along for a while before closing mostly due to mismanagement, infighting between committee members, and general disinterest (I#121). The farmer continued: "I know of at least four cooperatives where this has happened. I am surprised the international donors are not tired of this model by now, as it has not really worked for us here in the Maldives" (I#121). Reiterating the inappropriateness of the cooperative model for island farming in the Maldives, one of four Bangladeshi agricultural labourers succinctly noted: "We know about farming cooperatives from our country, Bangladesh. Maldivians do not like cooperatives. Sharing work with others is not in their minds. They like to be separate and not together for farming work" (D#14). And a participant NGO manager concluded: "Cooperatives were established to promote cooperative values, but for cooperatives to work, people have to cooperate, and this did not always happen (I#98).

**Cooperative mismanagement:** Twenty-seven participant farmers noted that cooperatives were often mismanaged to the point of being dysfunctional. They contended that this discouraged farmers from considering more commercial approaches to production in order to supply cooperatives on a regular basis (33 references). A past chairman participant of a cooperative confided that the general suspicion surrounding the poor administration of cooperatives was in some cases well founded. He referred to his term as cooperative chairman where he had attempted to get monthly accounts compiled, and farmers paid on time for supplying produce. Despite his best efforts, he was unable to bring about this change, and decided to resign (I#73).

Adding to the complaints of cooperative mismanagement, eight participant cooperative members noted that cooperatives were often seen to benefit the executive committee members and their friends, rather than the wider membership (9 references). One participant cooperative member quoted an example as he argued that his cooperative often gave priority to committee members in purchasing their produce ahead of other cooperative members; he added that this sometimes resulted in excess produce that the members were unable to sell (I#76). A discussion with four participant farmers revealed why they now preferred to produce directly for the neighbouring resorts rather than cooperatives. One of the farmers explained: "There is too much funny business in this coop. The committee are only doing committee job for their own benefit, they do not care about the farmers" (D#16).

**The implementation of cooperatives:** Mitigating the negative commentary surrounding cooperatives from participant farmers, seventeen participants noted ways in which the

immersion of cooperatives into island life may be differently implemented (29 references). For example, a participant agro dealer argued that MoFA needed to extend the pilot phases for introducing cooperatives into island communities from a few months to at least two years. He contended this would allow communities an expanded timeframe in which cooperative benefits could be demonstrated (I#107). Fifteen participant farmers agreed that cooperatives would be better received in island communities if they were able to demonstrate sustainable benefits to their member farmers (16 references). They continued that farmers wanted to see good examples of how cooperatives worked before they started doing business with them. As noted by a participant atoll council president: "The main reasons why cooperatives are not working well at the moment is because none of the farmers have seen any benefit from them, so what is the point in having them? (I#59). A participant farmer and treasurer of a cooperative added that farmers did not understand what the benefits of cooperatives were likely to be, and significantly, what the farmers role in the cooperative was supposed to be (I#70).

Fifteen participant farmers noted that that the most frequently cited benefit for the establishment of cooperatives was improved access to markets for farmers produce. However, the participants added that for cooperatives to exploit markets for the farmers produce, there had to be an uninterrupted supply of produce to the cooperative from the farmer (18 references). The participant farmer and treasurer of a cooperative illustrated this point by arguing that farmers had little idea of the loyalty required in supplying cooperatives with produce on a regular basis at a predetermined price and quality (I#70). He noted this was especially the case if the farmer sold his produce to another customer offering a higher price. The participant contended that the interruption in the supply of produce from the farmer to the cooperative hindered the cooperatives ability to honour supply contracts with customers (I#70). The participant continued that when the farmer wanted to then resume his supply to the cooperative, there was often difficulty in absorbing the produce as alternative supply sources had usually been identified, or the customer had discontinued trading with the cooperative. Despite this view, a participant chairman of a cooperative highlighted the benefit derived by farmers from his cooperative. He noted improved market links to resorts in the next atoll had resulted in increased orders of fruit and vegetables from the cooperative farmers (I#81).

A participant shopkeeper/farmer and ex-cooperative member articulated a widely held view amongst participants in this research that cooperatives were often able to unlock

MoFA/donor assistance for agricultural projects more effectively than requests from individual farmers (I#73). He posited that the legal framework and collective membership accompanying the cooperative model made them an attractive vehicle for MoFA and its donor partners in targeting topical agricultural issues such as climate change, while including vulnerable groupings such as low-income families, youth, and women, in MoFA initiatives. He concluded that: "MoFA and IFAD think cooperatives are a good way of helping the poor people on the island. I think so too, if they work properly" (I#73). A participant MoFA official agreed that collective farming bodies such as cooperatives were attractive vehicles through which assistance could be distributed to a wide number of beneficiaries. However, the official added that delays in implementing cooperatives due to complicated MoFA and IFAD regulatory guidelines for project implementation had deterred membership of cooperatives on many islands (I#125).

**FADiP and commercial farming companies:** As previously mentioned, MoFA embarked upon the FADiP programme in 2011 to promote greater sustainability in agriculture by linking subsistence farmers to commercial food producing and trading companies (O#144). MoFA envisaged the linkage between the two parties would be in the form of newly created joint equity value chain companies(O#144). In observing the proposed confluence of the two parties, nineteen participants noted that farming companies were expected to be more profitable, and thus sustainable, than cooperatives. They added that cooperatives were more associated with community welfare than profit (33 references). Despite the offer of concessionary funding and technical assistance, the FADiP process did not go as planned as neither party wished to be joined with the other in a value chain company (I#129). A participant commercial farmer/food trader explained that the FADiP approach of integrating commercial and subsistent farmers through a company structure was unworkable:

> My company has tried to work with farmers in the past and buy their crops for our food wholesale business. In the beginning it worked, but then it became erratic, so we stopped the agreement because it was more trouble than it was worth. We like to help the farmers, but we do not want to be too close because when it goes wrong we will get the blame and the bad name for not helping anymore. We like to do our business by ourselves with our family (I#110).

MoFA noted that it became clear that FADiP was not going to work as planned, and so they decided to form cooperatives instead of companies where subsistence farmers could collectivise their production and marketing efforts (O#139). Despite the limited performance of the FADiP cooperatives, a fishing cooperative model was discovered on an island field visit that was both successful and profitable. The cooperative had transformed itself into a

company in all but name, as it traded cooperative shares at a commercial premium, and accorded voting rights in respect of shareholding size (O#111). The participant chairman of the cooperative noted: "Our cooperative is like a business, which is why it makes money, and why it will stick around…our priority is to get a good profit for our few shareholders" (I#132). A participant MoFA official commented on this cooperative noting its strength was the business acumen and leadership of its chairman (I#125).

An outlier comment from a participant ex-commercial farmer relayed his uncertainty concerning both the company and cooperative model for developing agriculture. He noted: "We need to get the right mix of business and community working together. I am not sure how this will happen (I#126).

**Subcode 4c:** ***Individuals and families are the preferred farming unit.***

Fifty-six participants in this study noted that most Maldivian farmers had a preference for individualistic and family orientated farming, and to a lesser extent, farming with small groups of friends (78 references). At the core of this preference appeared to be an aversion to confrontation and disagreement where farmers became unhappy with the actions of fellow farmers (O#83). Forty-two participants noted that confrontation was most likely to occur over the mismanagement of money (51 references). Highlighting this concern, the wife of a participant husband and wife farming couple noted:

> If there is a group of people farming together who don't know each other well, there will be problems over money. Everyone will want to have a say about where to get the best selling price. Then there will be disagreement. That's why it is better to do the farming separately. That way if I make the money, I can decide on how to spend it (I#93).

Avoiding confrontation was a theme pursued by a participant ex-commercial farmer who noted that he and his partner had ended their farming partnership due to his partner's family no longer wanting to share the farming island with his family (I#111). He noted that even if the courts ruled that he could stay on the island, it would not work as his partners family would be unhappy. He explained: "For farming in the Maldives, it is easier to work without the bad feeling of others" (I#111). A participant UNDP official contended that the potential of social disruption on small islands as a result of confrontation applied to all aspects of island life and not just farming. He continued: "It's the family unit that does everything. In a few cases, a group of friends may do something together, but it does not usually involve money" (I#122).

The participant manager of an NGO that had previously been involved in the establishment of cooperatives in the 1980s summarised the preference for a family orientated approach to farming when he noted: "Farming has to be based on real trust that you get in a family. You do not get this level of trust in a cooperative with people you do not know well" (I#98). Despite this sentiment, a participant MoFA official noted that rifts within families had the effect of disrupting activities such as farming. The official continued that although the farming unit was preferred by many islanders, it still relied on external inputs such as technical expertise in order to function. Therefore, a balanced approach where the family farming core was tempered by external influences was necessary (I#129).

**Congregative farming practices:** Thirty-eight participants in this research noted that congregative farming practices such as farming with groups of friends were in evidence particularly in the case of women sharing field clearing, crop spraying, weeding, and harvesting (43 references). The data revealed that informal groupings of friends followed a pattern where farmers with adjacent field plots often shared workloads especially when fields required clearing, or weeding, at the same time. Women farmers were generally noted as being more accommodative in assisting other farming friends, although older participant farming couples also noted they had been sharing farming duties with their small groups of friends for many years (O#105). As noted by one farming couple: "Farming with our friends is an enjoyable pastime. We farm and gossip together in the evenings. We like this" (I#3). A participant school environmental club member added: "It's good when you see couples and groups of friends farming together. They are usually the older ones. But this type of farming is not usual in the Maldives because most farming is by yourself or with the family members" (I#44).

**Women's development committees (WDCs):** Nineteen participant farmers observed that the establishment of WDC's in the early eighties had provided a positive input into community agriculture (28 references). WDC's functioned through goodwill and volunteerism where five or six women would agree to lead WDC community activities, many of which related to farming small field plots to improve food supply for this island (O#112). Although the WDC's had no membership, subscription, or shareholding scheme, they engendered a community spirit that often outperformed more formalised island structures, also charged with assisting community development, such as island councils and island development committees (O#112). The demise of WDC's from 2010 onwards was mainly attributed to the Decentralisation Act of the same year, where WDC's were required to now fall under the

authority of island councils. This appeared to stifle WDC activity and was regarded as a setback in developing island agriculture by many participants in this research (O#112).

In a discussion with thirteen participant farmers, eight noted that when their WDC had been functioning, they had grown large amounts of chilli, cucumber, and watermelon in order to supply an island grocery shop (D#17). A participant NGO official commented: "In the end most WDCs just fizzled away. It's a pity because they did some good work especially with fruit tree planting in the household gardens. Now we have cooperatives, which do not work well because they have too many rules and regulations" (I#99).

A participant NGO manager noted that in some instances, WDC's and island development committees were the forerunners for the establishment of collective farming structures, as their membership often included island farmers who saw the benefit of working together in order to develop island agriculture (I#98). A participant MoFA official added that WDC's provided a conduit through which development aid could be directed to farmers (I#125). The participant NGO manager noted: "MoFA would see a women's development committee doing some good agricultural work on the island, and then use it to try and introduce cooperatives to the island" (I#98).

### Code summary

Box 4 presents key points to emerge from the Code 4, *Farm labour mainly comprised individuals within family farming units assisted by migrant workers.*

**Box 4. Key points from Code 4.**

- **Women and male expatriate labour farmers**: Women and Bangladeshi male labourers were the main farmers in Maldives. Maldivian men assisted with heavy lifting and acted as interlocutors with factor and producer markets. Maldivian farmers noted that farming in the Maldives was dependent upon Bangladeshi labour. Bangladeshi's were regarded as hard working and entrepreneurial, with some participants believing that they were controlling too much of the agricultural sector.
- **Formalised collective farming entities:** Cooperatives were criticised by farmers as their formalised operation was often at variance with informal individualistic and family farming practices. Farming companies were perceived as more profitable than cooperatives; cooperatives were noted as prioritising community welfare rather than profit.
- **Individualism in farming:** Individuals and family units were the preferred farming vehicles. Informal groupings of friends intersected with families in tasks such as field clearing and weeding. Women's development committees used to engage in community farming and were held in some high regard. Their demise was regarded as a loss to island agriculture by many participants.

**Code 5** **The sociocultural stigmatisation of agriculture, and lack of agricultural learning in schools, contributed to the absence of youth in agriculture.**

**Table 9. Code 5.**

***The sociocultural stigmatisation of agriculture, and lack of agricultural learning in schools, contributed to the absence of youth in agriculture.***

| Code: 5 | Subcode: 5a, 5b, 5c, 5d. | | No. of participants. | No. of references. |
|---|---|---|---|---|
| ***The sociocultural stigmatisation of agriculture, and lack of agricultural learning in schools, contributes to the absence of youth in agriculture.*** | 5a | *Youth prefer jobs in tourism, fishing, and the public sector, and regard farming as hard work, lowly paid, and the domain of the elderly and migrant labour.* | 69 | 148 |
| | 5b | *Community and parental stigmatisation of farming* | 37 | 68 |
| | 5c | *Teachers want more agricultural learning in schools* | 33 | 58 |
| | 5d | *Profitability and technology will encourage youth to farm.* | 51 | 91 |
| | | ***Total:**<br>* Any individual participant may have mentioned a theme more than once (or) on multiple occasions during the interview/focus group.* | **190** | **365** |

## Code introduction

Code 5 comprised four subcodes revealing participants views on the sociocultural stigmatisation of farming as a low class, poorly paid, activity. Parental stigmatisation of farming directed towards children compounded this view and made it difficult for teachers to present agricultural activity as a potential employment and income generating opportunity. Many participants teachers in this research noted that in order to overcome the stigmatisation of agriculture, and attract youth into farming, agriculture needed to be portrayed more as a business opportunity employing technology, rather than one mired in subsistence activity which was rooted in traditional field farming.

### Subcode 5a: *Youth prefer jobs in tourism, fishing, and the public sector, and regard farming as hard work, lowly paid, and the domain of the elderly and migrant labour.*

At the forefront of this sub code was comment from sixty-nine participants relating to the monopolisation of youth labour by the tourist sector, and to a lesser extent, the fishing industry, and public/ private sector employment (148 references). Reasons for this labour monopolisation are now explored.

**Youth do not want farm:** Fifty-one participant farmers asserted that the vast majority of youth were interested in working for tourist resorts and would not normally consider working in agriculture as a career prospect (58 references). As noted in a discussion with four

participant youth: “Never in my life will I do farming. We never thought about it. We are not interested in farming. On this island, no youth is doing farming” (D#13). Confirming this assertion, five participant island council officials observed that 80% of the youth on their island had migrated to the tourist sector; they added this was unsurprising given the proliferation of resort development nearby to their island (O#123). The officials further noted that unlike working on a farm which was regarded as hot dirty work, working in the tourist sector was often regarded as a status symbol by youth, as it brought them into closer contact with a western lifestyle that was perceived as desirable (O#123). Highlighting this notion, a participant commercial farmer recounted a conversation with a young friend: “One of the young guys was talking to me about jobs, and I mentioned farming, and he said ‘no’. He said it was his dream to work as a speedboat captain for a resort. He believed he could have fun working in a resort” (I#115).

Eighteen participants contributing to this subcode commented upon the attraction of public sector employment for youth (22 references). They argued that unlike farming, the Maldives National Defence Force, Maldives Police Services, and the civil service, offered competitive remuneration packages, career opportunities, and respect amongst their contemporaries (D#17). In a discussion with eight youth participants, one elaborated on this sentiment when she noted: “We have seen that farming is not an easy job. We watch our parents and others do it. It is a very hard struggle, with often less money at the end. It will be easier to sit at a table pressing buttons on a computer” (D#11).

A participant commercial farm manager noted that if boys did not gravitate towards the tourist sector or civil service, they usually ended up fishing. He noted “We are a fishing country, and the sea is all around us, so it is natural for many boys to follow their fathers and go fishing. It’s in our blood to do this” (I#115). In a discussion with thirteen participant farmer/cooperative members, it was noted that few youths from the islands went on to do higher studies, preferring to either enter the labour market or assist in family activities (15 references) (D#17). In summing up employment opportunities for young males, one participant male youth noted:

> If we boys are clever, we will do a job inside the office where it is a cool temperature, and the work is not too hard. If we are not that clever, maybe we will go on the fishing boats or mostly go to be a room boy at the resorts. Farming is not for us. We do not want to work in the fields getting hot and dirty. This is the job for Bangladeshi workers (I#33).

Responses from participants regarding employment opportunities for girls were less audible in the data collected. However, sixteen participants commented that girls would most likely

marry early and start a family, during which time they would tend household gardens, and maybe work in the larger family field plots (24 references). In a discussion with eight participant members of a youth organisation, four female participants commented on their employment opportunities relating to farming. One of the female members noted: "I will try and do some more study or maybe work in a shop. If I stay on the island, I will do some gardening work at the house as well, and sometimes maybe help in the fields, but I prefer to work in a shop if I cannot study more" (D#11).

**Farming is for the elderly:** Seventeen youth participants in this study believed farming was an activity mainly undertaken by old people. Old people were most commonly categorised as being between 35-60 years old (27 references). Youth participants further believed that they would probably undertake farming when they were middle aged or older, probably as a pastime and to earn a small income in order to supplement pensions (D#11). Sixteen participant parents of youth agreed that their children would probably take over the family farms when they were older and spent more time on their home islands. A husband and wife farming couple summed up much of the sentiment relating to ageism in the perception of farming when the wife noted: "Me and my husband thought we would not do farming when we were 25 years old, but now we are 54 and 60 years old and we like farming. Our kids will be the same" (I#93).

**Farming is a low paid activity:** Nineteen youth participants noted that farming generated little or no profit and was, therefore, a low pay activity (24 references). A participant head teacher argued that the youth often saw first-hand how the market price for their parents produce did not cover the production cost, and the parents ultimately incurred a loss (I#24b). In a youth discussion comprising four participants, they noted that older farmers had told them the market was difficult, and it was hard to make any money out of farming. The participants added that they were often told by elders and their parents that it was better to use their education to get a desk job in the Island Office or in Male' where they could earn more money (D#13).

The comparison between fishing and farming income was made by many youth participants in this research. In a discussion with five participant fishermen cooperative members, all of whom were under the age of thirty-three years old, their chairman noted that most young men on their island were working on the fishing boats earning a good living. He noted: "The boys who are working on the boats on our island earn more doing part time fishing in one month than they would earn in a fulltime government job for a month. Of course, fishing is

better than farming for getting money" (D#15). Elaborating on the attraction of fishing over farming for youth, a participant MoFA official noted: "Fishing gives an instant income that is usually quite high. You catch the fish and sell it the same day. But with farming you have to wait and see what you get when you harvest and sell. Young people don't want to wait" (I#125).

**Youth engaged in farming:** In spite of the negativity surrounding farming from the majority of youth interviewed in this research, positive feedback from nine young participant farmers, and three participant students espoused the virtues of farming as providing profit and enjoyment (13 references). In a discussion with six young participant farmers, one participant explained: "All of us think farming is interesting, and we get good money from it. It's a good experience for us and we like it" (D#21). The participant manager of an NGO further observed that more young people were engaged in farming today because they liked using technology in greenhouses: "The young farmers have turned their farms into businesses with greenhouses and irrigation. They can get a good market this way" I#99).

When asked if the young farmers engaged in farming were actually doing the physical labouring on their farms, all participants revealed that they were utilising expatriate labour from South Asia, mainly Bangladesh. However, three participant young farmers noted that they were physically working with their labour force in the fields (11 references). As noted by one participant young farmer: "We work with our labourers so we can teach them the way we want to do things. We all work nicely together" (I#56).

**Subcode 5b*: Community and parental stigmatisation of farming.***

**Farming as a low-class activity:** Thirty-seven participants noted that communities often stigmatised farming as a low-class activity. They further contended that this shaped the negative youth view of farming (68 references). Reinforcing this contention, a participant MoFA official noted that pointed reference to the de-stigmatisation of farming was articulated in the Governments 2009 Strategic Action Plan with a view to encouraging youth labour into the agricultural sector (I#120).

During this research, it was observed that the community perception of farming as a low-class activity, appeared rooted in sociocultural customs, sayings, and actions, that denigrated farming as an activity undertaken by servile labour (O#121). As noted by a participant school headmistress: "It goes back to some of our past literature and proverbs where farmers were regarded as low caste because they worked in the fields. For example,

our literature often mentions the role of toddy collectors[39] referring to them as of low caste (I#113).

Despite the traditional stigmatisation of farming, an outlier comment from a participant ex commercial farmer noted that he had great respect for his grandparents who were dedicated farmers. He noted: My grandparents were very hands-on farmers. Although I am not a farmer, I have never regarded farming as something below my dignity. Farmers from the past and present are very dignified people who should be respected (I#126). The theme of respect for farmers was echoed by three participant students. As one student explained:

> Farmers and fishermen are the backbone of the Maldivian society. If it weren't for them, we would have sunk a long time ago. People don't know how important it is for people to work with their hands to try and make food for us. Farming is not appreciated here, but we youngsters do appreciate what they are doing (I#64).

**Educated people don't farm:** Sixteen participant farmers noted that educated youth were not expected to farm, especially by their parents, but rather obtain white collar jobs where their education could be better employed in generating a higher and more stable financial income (19 references). Illustrating this point, a participant school headmistress commented:

> Parents want their children to be neat, tidy, and study hard, and not get involved in dirty activities like going to the fields to work in the evenings when they could be studying instead. Parents do not want the children to waste their education on labouring when they could get a good desk job (I#113).

Similar sentiment was expressed in a discussion with eight participant youth members when they noted that their parents would be very unhappy if they went home and said they wanted to be farmers. One participant youth noted: "Our parents will say to us that we have to do 'behind the desk stuff' for our jobs, and not this farming" (D#11). Fifteen participant parents explained that one of the main reasons they did not want their children to engage in farming was because they were uneducated themselves and knew how hard farming was as an occupation (20 references). One participant farmer noted that he wanted a better life for his children than manual labour in the fields (I#75), and the husband of a participant farming couple commented: "Our children are not in the fields. They have good desk jobs." (I#93).

The belief that educated people should exclude farming as an occupation was summed up in a discussion with four participant cooperative members/farmers (D#16). One participant noted: "Farming is a low standby job. People with good education will look for opportunities

[39] Toddy collectors were labourers involved in draining the sap from palm trees in order to make sweet sugary snacks known as jaggery.

in tourism not farming." (I#46). And a participant commercial farmer added that farming had traditionally been regarded as a safety net for uneducated males who had the physical ability to engage in hard manual labour (D#26). A participant school headmaster confided that the high level of stigmatisation surrounding agriculture had proved challenging in persuading parents that agricultural sustainability resided in youth involvement. He added that many parents still equated the teaching of agriculture as going to work in the fields as labourers (I#41).

**Farming is the work of migrant labourers:** The perception of migrant agricultural workers being widely regarded as servile labour has already been made in subcode 4a**:** *Women and male migrant labourers are the main farmers in the Maldives.* In exploring this perception further, ten participant farmers noted that because south Asian male labourers undertook the majority of farming labour, the youth automatically associated farming as a lowly labouring activity. Compounding this negative recognition were observations that migrant farm labourers were poor, and often living in make shift shacks on the edge of fields they were cultivating. As noted by one participant head teacher/parent: "Of course our kids see how hard these labourers work and how poor they are. The kids think there is no way I want to do any work like this, and this is what the parents think as well" (I#41). In a discussion with four participant youth, they noted that they would be more interested in farming if they could assume a supervisory role over foreign labour. One of the youth noted: "We can get some labour from Bangladesh and tell them how to do the farming. They can do the hard work, and we will organise. We will pay them good rates and give them food and accommodation" (D#13).

Twenty out of twenty-four participant Bangladeshi agricultural labourers interviewed in this research agreed that Maldivian youth were reluctant to work in agriculture (29 references). They added that they rarely saw young women or young men working in the fields and noted that young men would rather sit in cafés all day drinking coffee, or ride around on motorbikes with their new mobile phones (D#14). The general comment from the Bangladeshi participants observing this situation noted that young Maldivians did not like farm work because it was hard and dirty (D#14). Extending the view of indolent youth beyond agriculture, fifteen participant farmers further noted that it was problematic in motivating adolescent males of low academic achievement to get any job (19 references).

**A changing view towards farming:** Despite the general stigmatisation of farming as a low-class activity, four participant resort horticulturists noted that the view of farming was

changing amongst the youth as it was becoming increasingly linked to the tourist sector through the provision of food to resorts (D#26). A participant farmer and cooperative member agreed that youth participation in farming was increasing as young people had seen government initiatives demonstrating technology in farming. He added that the youth had begun to experiment with this technology on small plots of land on his island (#100).

In encouraging youth to engage in farming, a participant MoFA official acknowledged that presenting farming as a clean, technologically driven business opportunity would encourage more youth to consider farming as an occupation (I#120). A participant farmer reaffirmed this view when he noted: "Now farming is becoming profitable and respectable to young people" (I#12), and a participant teacher added that the perception of parents and children towards farming was moving from one that had previously involved labouring to one that now embraced learning(I#32).

**Subcode 5c: *Teachers want more agricultural learning in schools.***

Thirty-three participants contributing to this subcode, eleven of which were participant teachers, noted that they wanted see more agricultural learning in schools (58 references).

**Agriculture taught as a dedicated subject:** Within the current national curriculum, participant teachers commented that agriculture was not a dedicated subject, but rather taught around the edges in other subjects (O#39). For example, participant teachers noted that the impacts of climate change upon agriculture were taught in the subject of environmental studies, and in the school environmental clubs (O#39). Twenty participant teachers commented that if this were to be the modus operandi for imparting agricultural knowledge to students, pertinent issues affecting island agriculture, such as pest control and pesticide usage, should somehow be included (40 references).

A participant headmaster contended that in order for agriculture to be taken seriously as a career option and an employment opportunity by the youth, its inclusion in the national curriculum as a dedicated subject needed to replicate the importance attached to the taught subject of fisheries science (I#41). He added that this would elevate the practice of agriculture in the minds of parents and students alike. A further comment from a participant headmistress commented upon her efforts to introduce agriculture as an extra curricula activity:

> I am teaching agriculture in the afternoons after school. I like the students to do hands on work in the school garden plots, so they come and dig, water, harvest and also sell the crop.

> They are enjoying it, and I want to keep it going and tell other schools what we are doing (I#77).

The significance of the extra curricula teaching of agriculture was acknowledged by a participant headmaster in gaining a practical understanding of how plants were cultivated and harvested (I#41). However, he argued that a greater theoretical understanding of the issues affecting agricultural output was also required and could only be obtained through academic teaching. He contended that this depth of understanding was imperative if agriculture were to be taken seriously as a business: "There is no critical thinking on agriculture because we don't teach it as a subject. That's why agriculture is not really a main business for Maldivians" (I#41). On the issue of academic teaching, a participant headmistress posited that whilst admirable in its objective, there was a dearth of teachers with the required agricultural knowledge to pass onto their students (I#61).

**Agricultural initiatives intersecting with teaching:** A participant vice principal of an atoll school noted that schools often became the implementing agencies for assistance given to community agricultural projects. However, she noted that the assistance was often incomplete, either lacking in equipment or technical expertise, which resulted in the project failing (I#61). The participant vice principal further noted that the Technical, Vocational and Education Training (TVET) programme which was designed to provide vocational learning, should emphasise agricultural learning. At this stage, she was unaware of any efforts in the area of agricultural teaching (I#61). Farming internships on commercial farms were suggested by eight participant teachers where students could learn how to farm more intensively using technology, and as importantly, learn how to generate a commercial return from farming (15 references). A participant commercial farmer commented upon this approach when he noted: "Students could come and stay with us and experiment with some ideas they have. They could also learn how to work with the market, and how not to lose money. It's a good idea for them to get first-hand experience" (I#87).

In the final comment in this subcode, a participant deputy principal noted that irrespective of how schools attempted to accommodate greater agricultural learning for the students, it was a national priority to try and get this done. She further noted that every student leaving school should have the capacity to plant, nurture, and harvest food for their own table (I#61).

**Subcode 5d: *Profitability and technology will encourage youth to farm.***

The message to emerge from this subcode was clear in placing profitability and technology as key considerations in motivating youth to engage in agriculture (51 participants, 91 references).

Participants contended that both considerations would convey that agriculture had graduated from conventional field farming, to an activity that employed technology to generate a profitable business. A participant MoFA official agreed: "If we show young people that farming can be like this, they will come and do it" (I#129). From the data collected in codes 1 and 2, it was also clear that the participants reference to profitability was inextricably linked to their understanding of building agricultural capacity through sustainable means.

**Profitability:** Thirty-six participants noted that profitability would be the main motivator of youth to engage in farming (39 references). As noted by a participant cooperative treasurer: "If the youth know that farming can be profitable for them, and they can survive and feed their families, they will stay on their islands and do farming" (I#70). However, a participant deputy principal noted that there was a problem in students knowing that farming had the potential to be a profitable activity. She noted:

> At the school, we had someone explain how profitable farming could be. None of the students realised this. They had not even thought about farming as a job. But they listened to this man because he said the income from farming was good, and higher than teachers' salaries. In fact, we all listened hard (I#61).

Three participant young farmers from a large agricultural island noted that they had realised the profit potential of farming and had left their previous salaried jobs and taken up fulltime farming. One of the participants noted: "Farming makes a good income for us. It makes a profit" (I#54).

**Technology:** Fifteen participants noted that the employment of technology in the farming process was an attraction to youth as it was associated with automated growing systems in environmentally controlled conditions (16 references). The participants further noted that such an association diluted the stigmatisation of toiling in open fields in hot dirty conditions. Summing up this sentiment, a participant farmer noted: "Farming must be transported in the youths' minds from a low-level activity to a business with endless technical possibilities." (I#115). A participant farmer/food trader illustrated this point when he noted that Maldivian youth were attracted to technological advance in all aspects of life, the most noticeable of which appeared to be prolific use of computers and mobile telephony (I#66). However, countering the belief that the employment of technology was a panacea for motivating youth participation in farming, a participant MoFA official noted: "There is no guarantee that technology would motivate the youth enough to get them into farming. The technology has to be relevant, and not just used to get youth to farm" (I#53).

Evidence that technology was encouraging farming amongst the youth came from a participant NGO manager, as she noted that the youth of a large agricultural island had recently installed a greenhouse with hydroponic system to cultivate chillies. She further noted that this was being done on a fairly large scale and had aroused the interest of larger chilli farmers on the island who were employing more conventional chilli cultivation methods (I#99). The participant NGO manager concluded that youth wanted to be involved in profitable businesses that used greenhouses and hydroponic cultivation in order to supply the lucrative tourist markets with produce (I#99).

## Code summary.

Box 5 presents the key points to emerge from Code 5, *The sociocultural stigmatisation of agriculture, and lack of agricultural learning in schools, contributed to the absence of youth in agriculture.*

**Box 5. Key points from code 5**

- **Youth preference for employment did not include farming:** Participants associated conventional field farming as hot, dirty, work undertaken migrant labour for low pay. It was also associated as a retirement activity for the elderly. Youth wanted to work in tourism, the civil service, and fishing where financial remuneration was perceived as greater and more secure.
- **Stigmatisation of farming as a low-class activity:** General community stigmatisation of farming was sharpened by parental disapproval of its activity for their children. Farming was stigmatised as a low-class activity undertaken by the uneducated, and poor migrant labour. Parents believed education provided good jobs, and, therefore, should not be wasted on farming. The links between farming and tourism were strengthening, with some parents and children now considering farming as a business in supplying food to resorts.
- **Teachers wanted more agricultural learning in schools:** Participant teachers wanted agriculture to be introduced as a dedicated subject, as in the case of fisheries science, rather than being taught around the edges in other subjects. They noted the link between a lack of teaching in agriculture and a lack of student interest in farming. Participants noted that students needed both a theoretical and practical understanding of agriculture; it was hoped this may propel students into thinking of agriculture as a business for the future.
- **Encouraging youth to farm:** Profitability in farming through the use of technological advancement was noted as key motivation in encouraging youth to farm. Youth wanted to be involved in profitable businesses that used greenhouses and hydroponic cultivation in order to supply tourist markets.

**Code 6** **Farmers believe that reducing food imports will boost local production.**

**Table 10. Code 6**

***Farmers believe that reducing food imports will boost local production.***

| Code: 6 | Sub code: 6a, 6b, 6c, 6d, 6e. | | No. of participants. | No. of references. |
|---|---|---|---|---|
| ***Farmers believe that reducing food imports will boost local production.*** | 6a | *Greater self-sufficiency in existing crops, and the trialling of new crops.* | 58 | 72 |
| | 6b | *Food trader preference for imported food deters local production.* | 30 | 42 |
| | 6c | *Unfair competition from foreign farmers with lower production costs deters local production.* | 21 | 36 |
| | 6d | *Gov. should control/reduce food imports through tariffs and quotas.* | 18 | 25 |
| | 6e | *Lower transportation costs are associated with local production.* | 16 | 21 |
| | | ***Total:** * Any individual participant may have mentioned a theme more than once (or) on multiple occasions during the interview/focus group.* | **143** | **196** |

## Code introduction

Code 6 revealed the assumption held by many participant farmers that a reduction in the level of imported food would act as a stimulus in boosting local food production. The formation of this assumption appeared rooted in three main considerations. These were: food traders' preference for dealing in imported food as opposed to locally produced food; cheaper pricing associated with imported food due to lower production costs in the country of origin; and, cheaper transportation costs associated with locally produced food. In addressing these considerations, participant farmers believed that the GoM should institute protectionist tariffs and quotas to reduce food imports. The credibility of the assumption that reducing food imports would boost local production was questioned by participant food traders and MoFA officials, with the latter discrediting the imposition of protectionist barriers to boost local production.

**Subcode 6a:** ***Greater self-sufficiency in existing crops, and the trialling of new crops.***

Fifty-eight participants in this research believed that higher levels of self-sufficiency amongst some crops already grown in the Maldives could be achieved through increased productivity. They further believed that new high value niche crops could be trialled in the Maldives to provide more of the tourist sector food requirement (72 references). However, amongst these participants, forty-three further acknowledged that the productive capacity

of local farmers was limited, particularly in relation to the range of food required by the tourist sector, and therefore, imported food would always be required (58 references).

**Increased self-sufficiency:** A participant farmer with a small hydroponic unit producing lettuce and honey melon commented upon prospects for increased levels of self-sufficiency when he noted: "We can produce more of the fruit and vegetables this country needs. But we do not how to grow some things like pears and animal meat so we still need these items to come in from outside" (I#5). A participant managing director of a large resort company added: "The farmers should concentrate on what they are good at growing like some fruits, and lettuce, but we are never going to be 100% self-sufficient because we cannot produce things here like dairy and meat, so we need imports" (I#105).

Sixteen participant farmers contended that the Maldives had already become self-sufficient in some crops like watermelon, small bananas, and lettuce (26 references). Agreeing this contention, a participant commercial farmer noted: "When we started agriculture in Maldives, we were not self-sufficient in papayas and bananas. Now we are." (I#102). In achieving greater self-sufficiency, a participant managing director of a large fisheries processing facility posited that the Maldivian farmers now required more government assistance in expanding crops that grew well in the Maldives. He continued that this would achieve improved national food security (I#109). An outlier comment from a participant commercial farmer noted that there was already a good level of food security in the Maldives: "What people grow on their island is sufficient for them. We have fish and coconut everywhere, and we can buy rice or use taro instead of rice (I#20).

Acknowledging the limitation of local production in providing the quality, quantity, frequency of delivery, variety, and pricing, required by the tourist sector for their food requirement, eight participant tourist sector personnel, and four participant commercial food distributers supplying the tourist sector, commented on the unlikelihood of this situation changing in any great measure (18 references). As noted by a participant commercial food distributor supplying food to the Maldives from Thailand: "Resorts cannot get the quantities and varieties of food from local farmers in Maldives, so the resorts will always have to import" (I#141). While the demographic distribution of imported food in the Maldives was not examined in this research, the assumption existed amongst most participants that the majority of imported food was for the tourist sector, and the majority of locally produced food for the resident population. This assumption was typically based upon the

stronger purchasing power of tourists for imported produce compared to that of local residents (I#130).

**New types of crops and food staples:** Twenty-two participant farmers believed that new crop varieties should be experimented and trialled in the Maldives (27 references). A participant farmer noted: "We import so many chicken eggs from India and Sri Lanka. We can have chicken farms here if we get a feed mill. Also, we can try growing berries like raspberries and strawberries in the greenhouses. We already grow new crops like lettuces well here" (I#69).

Despite the desire to experiment with new crop varieties, there was general agreement from most participant farmers that staples such as rice, and grains for flour, would be unlikely to prosper in the Maldives due to limited land and water resources (O#81). Hence, one participant farmer noted, that these staple items would always need to be imported: "We can produce more food, but not the rice and flour which is our main diet with fish and coconut. Of course, flour and rice have to be imported (I#70). An outlier comment from a participant cooperative official noted the importation of rice to his island was interrupted during World War II, and so the community reverted to growing the traditional taro starch crop (I#81).

**Subcode 6b: *Food trader preference for imported food.***

Preference by food traders and resorts for imported food was alluded to in code 8, *Farmers have difficulty in connecting with the market in order to sell their produce,* where the control of food imports and pricing by market traders in the Male' market was discussed. However, in this subcode, forty-three participants from the tourist and commercial food distribution sectors revealed their reluctance to curtail food imports in favour of local production sources (78 references). The reluctance focussed on the ease of conducting trade with external food suppliers where pricing, quality, quantity, variety, and continuity of supply were all of a uniformly high standard, whereas local production sources possessed few of these characteristics.

**Ease in dealing with imported food supplies:** All of the forty-three participants contributing to this subcode acknowledged that they sourced the majority of their food supply through imports, either directly from external food suppliers, or through local food traders who had already imported the food. The participants characterised the process of dealing with imported food supplies in terms of ease. As noted by a participant resort executive chef:

> We don't even have to pick up the phone and call the suppliers anymore. All our ordering is now automated online. It's quick, easy, cost efficient, and we know what, when, and how we are getting the food items. Even the storage temperatures during transportation are recorded, along with details of the packaging. We need this guaranteed food supply for our resorts (I#90).

In elaborating on the procurement process for imported food, a further eight executive chefs (10 references) and five food and beverage managers (11 references) noted that computerised orders were placed between ten and forty-five days in advance with external food suppliers. The participants contended that this was usually an adequate timeframe for food suppliers to ensure that the customer's order was fulfilled. In a discussion with four participant resort staff, the manager noted: "With imports there is more chance of us getting what we order than if we order from local farmers. Sometimes local farmers just do not have what we want even if they said before that they would supply. This lets us down" (D#26). Summing up the general sentiment concerning the ease and reliability of imports over sourcing local production, a participant executive resort chef of noted: "If you order 50 kilos of mango from Thailand you will get it. Even if the Thai supplier does not have mangoes in stock he will find them for you. He will never say we cannot supply them. Local farmers cannot provide this service yet (I#136).

The ease in dealing with foreign food suppliers was noted by participants as dependent upon building trading relationships based on trust, reliability, and competitive service. A participant food trader observed that the fierce competition by external traders to supply the Maldives enabled profitable relationships to be established. He added: "They all want to be our suppliers because we pay good prices. Our company has been dealing with six main suppliers for over five years. They provide us with a good product and service. If they don't, we will go to another supplier" (I#110).

**Pricing:** Twenty-seven participants in this subcode noted that the price of imported produce was often cheaper than the same produce grown in the Maldives (30 references). As noted by a participant food and beverage resort storekeeper: "With bananas, twenty bunches of bananas from India are cheaper delivered to my resort than six bunches of the same type of bananas from Maldives that are sold in the Male' market." (I#107). Confirming the higher cost of locally produced food, a commercial farmer noted: "It's cheaper to bring your fruit and veg from India than go to one of the agricultural islands in Maldives and buy it. Even with the transport cost" (I#121). Within this section, there was virtually no mention of imported goods being more expensive than their locally produced rivals. Many participants attributed this phenomenon to lower production costs in the main food exporting countries to

Maldives such as in: Sri Lanka; India; Dubai; Singapore; Thailand; Australia; and, to a lesser extent some western European countries. Lower production costs in exporting food countries are discussed in the next Subcode 6c, *Unfair competition from foreign farmers with lower production costs deters local production.*

**Quality:** Thirty-six participant customers of imported food discussed the importance of uniform quality being difficult to obtain in locally produced food, whereas the uniformity in taste, texture, size, and presentation was evident with imported food (41 references). As noted by one of two participant food and beverage resort staff:

> Firstly, we always consider the quality of the produce. This is the number one concern for us because if it is not acceptable to our clients then all the other things like price don't matter. The items have to look and taste good. The watermelon must be red not pink, and it must be sweet not tasteless (I#131).

Twelve participant resort staff in this subcode associated food quality with organic produce (14 references). Participants believed the term 'organic' conveyed the notion of healthier food and provided an added selling point to tourists. This research observed that eight out of eighteen resorts visited classified their kitchen gardens as producing organic produce. Clarification with the resort horticulturists tending the kitchen gardens confirmed that their produce was not organic as some chemicals were used during production. One horticulturist noted that rather than attaching the word 'organic' to the food description, another term conveying a more natural approach to cultivation was required (O#130).

Trader preference for imported food was further directed towards product type as illustrated by three young participant farmers in the case of local chilli production. One of the farmers explained: "We are losing our chilli market because customers want the smaller milder ones from India now, not our big hot ones. So, traders are bringing them from India" (I#54). I enquired why the farmers did not grow the smaller milder chillies if that was now what the market wanted. They noted that they were unsure of which chilli seeds to use, and how to get them (O#38).

**Quantity and continuity of supply:** Twenty-seven participant food customers in this subcode posited that sourcing adequate quantities of produce on a regular basis was of particular importance to the smooth running of their resorts and food trading businesses (44 references). A participant food and beverage manager contended that external food suppliers were capable of providing this service, whereas local producers found it problematic (I#134). In conveying frustration over the disjointedness in local supply, a participant food trader

noted: “It sometimes starts OK, but then falls apart. Although the quality and price are usually OK, they cannot deliver the quantities that we want, at the time we want…it’s better to get the imports” (I#6).

Twenty-one participants noted that farmers were unreliable in fulfilling undertakings or supply agreements they had made with resorts and food traders for delivering orders on time, and to the specification required (25 references). As noted by a participant purchasing manager: “You cannot just rely on local farmers to supply, because often they run out of stock. They will supply what they have, but it’s not enough. That’s why we always end up going back to the outside suppliers because they are regular.” (I#135). A participant ex-commercial farmer noted repeated the sentiment when he noted: “The resort F&B departments will never cut back on foreign food orders until they are sure local farmers can supply regularly” (I#126).

According to two participant food and beverage resort staff, food flows from cooperatives to their customers fared little better in terms of continuity of supply. One of the staff members noted: “The cooperative on the next island can supply good quality items at competitive prices but not on a regular basis. They do not plan production so there are always surpluses or shortages.” (I#9). Commenting on the erratic supply flows of farmers to their customers, a participant MoFA official noted that cooperatives had little luck in corralling the production schedules of farmers to ensure a constant throughput of food items to the cooperatives (I#10).

In terms of enforcing supply agreements, the resorts and food distributors considered that it was not worth the effort and expense to seek legal recourse for non-performance against farmers’ supply agreements. Instead, they appeared resigned to the fact that farmers would usually deliver what they could if the price was attractive to them. An outlier comment from a participant resort manager elaborated on how price often regulated continuity of supply from farmers to customers:

> Our relationship with farmers was OK and we became dependant on them for some food items. They saw this, and then tried to raise the price as they thought the resort needed them. We refused to pay the higher price, and instead purchased imports through a food trader in Male’. Then the farmers came back to us, but we told them we were not interested in doing business like this (I#83).

In spite of the scepticism by participants over the farmers’ capacity to supply uninterrupted food flows to customers, ten participant food traders noted their positive experiences in

dealing stable food flows from local farmers (14 references). A participant fruit and vegetable trader of long standing noted:

> We have a few farmers who have been supplying us for years. They know we have agreements to supply resorts, so they do not let us down, and always give us good quality pumpkin and watermelon. If we have big last minute orders, we top up with imports from Male'. We can always supply our customers (I#11).

A participant food and beverage manager sourcing directly from farmers on a neighbouring island added: "Those farmers have been supplying us with bananas for 20 years. They are very reliable and send to us twice a week, every week." (I#136).

**Profitability:** Commenting upon the preference of food traders to purchase imported food, a discussion with four participant farmers noted that traders could derive more profit by trading imported food than trading locally produced food (D#19). Agreeing this sentiment, one of six participant farmers in another discussion noted: "Traders are not getting enough money if they take our food, so they buy from outside because it is cheaper. They can make bigger mark-up" (D#20). A participant MoFA official concurred when he noted: "Often traders prefer to source food from outside the Maldives…it can be cheaper, fresher, and easier to get, and they make more money out of selling it than they do locally produced food" (I#129). Comment from five participant traders confirmed the profitability of trading imported food and locally produced food (8 references). However, the traders were hesitant in commenting on which food source was the most profitable.

Commentary on the preferences of traders in imported food appears in greater detail in Subcode 8f, *Preference for food imports based upon ease and reliability.*

**Subcode 6c: *Unfair competition from foreign farmers with lower production costs deters local production.***

Analysis of this subcode revealed that twenty-one participants farmers believed competition from Indian and Sri Lankan farmers was unfair because of their lower production costs. They contended that this made foreign produce cheaper to import for Maldivian traders (36 references). The same participants further contended that higher local production costs deterred their efforts to expand local production, as they would be unable to sell their produce at a profit and would instead incur a loss (28 references). Elaborating on this understanding, participant farmers noted that Indian and Sri Lankan farmers were able to access cheaper locally manufactured farming inputs such as seed, fertiliser and chemical pesticides, and cheaper labour (O#136). Participant farmers added that although they used many of the same farming inputs as their Sri Lankan and Indian counterparts, they were

significantly more expensive by the time they reached Maldivian farmers due to trader margins and transportation costs being added (O#136). In a discussion with thirteen participant farmers who were members of the island cooperative, one farmer observed: "We cannot compete with outside farmers sending food to this country because our costs are too high. It is easier just to import the food than trying to grow it here" (D#17).

**Subcode 6d: *Gov. should control/reduce food imports through tariffs and quotas***.

Eighteen participant farmers noted a high level of dissatisfaction concerning the periodic dumping of cheap food from neighbouring countries, particularly from India, into the Maldivian market, and the detrimental effect this had upon Maldivian farmers trying to sell their produce in the local market (25 references). The participant farmers further contended that they were often left with last minute surpluses due to traders cancelling orders in favour of cheaper goods that had just arrived in the country (21 references). In order to control this situation, participants recommended that import duties and quotas be imposed on those food imports which were being produced in the Maldives.

**Import duties:** In response to the allegation of indiscriminate food dumping by neighbouring countries, thirteen participant farmers stated that it was the role of government to regulate food imports through import duties (18 references). In a discussion with six young participant farmers on a large inhabited agricultural island, their spokesperson noted: "Because local traders have a good chance to import food at a very low price, people do not need to buy our local products. We are left with them. We need something to protect us from this like a duty" (D#21).

Support for using import duties as a control mechanism to regulate food imports into the Maldives in order to encourage local production came from a participant director of a fish processing facility. He noted: "If government put a duty on imported watermelon and chilli, farmers would grow more of them, and at a good price for farmers and customers" (I#109). A participant trader of farming inputs agreed with higher import duties but for slightly different reasons. He noted: "Government should put a duty of 50% on food imports. That will encourage farmers to grow more, and I can sell more seeds and fertilisers. The government could also make a lot of money from the import duties" (I#107).

Correcting the notion that food produced in the Maldives was unprotected from dutiable imports, four participant officials from Maldives Customs Service observed that the importation of watermelon, bananas, mango, and papaya, all attracted an import duty of

15%. They further noted that there was a restriction on the importation of whole coconuts, although the restriction did not relate to an import duty (O#143).

**Import quotas:** Import quotas were not as widely mentioned in the research as import duties, however, two participant cooperative member farmers noted that allowing certain amounts of produce into the Maldives to supplement existing production would be an effective method of reducing food imports (I#19). The participant director of a food distribution business concurred with this reasoning and added: "If we know that the demand for watermelon is 800 tons during Ramadan, and our country can produce 500 tons, then we can allow an import quota for 300 tons. This could be a good control" (I#110).

A participant MoFA official noted that the call for import duties and quotas on imported food would not necessarily see farmers being paid more for their produce, or customers receiving more competitive pricing. He added: "The only people who will really benefit from duties and quotas would be the traders who will still manipulate the price to their advantage" (I#120). Confirming this position, three participant food traders noted that their business was simply to generate margins on sales of fresh fruit, vegetables, salad leaves, and spices. They noted that they did not care whether the produce was imported with higher duties, or sourced locally, as they would pass the cost onto the consumer and still retain their margins (O#141).

**Subcode 6e:** ***Lower transportation costs are associated with local production.***

According to sixteen participants in this study, a driver for boosting local production was the perception that domestic transportation costs in distributing locally produced food would be less expensive than freight costs for food imports (21 references). A participant resort food and beverage manager explained: "If you try to buy from Dubai or Thailand, it will be a huge air transport cost. We are saving a hell of a lot in transport by producing here in Maldives" (I#136). A further comment from a participant resort chef commented on types of imported produce that attracted high transportation costs: "If I buy mint from Australia, I have to pay U$10 [ 8]/kg by the time I get it to the resort with all the charges. I was buying 10kgs a week, but now I am growing it on our island and this saves me U$5,000 [ 4,000] a year most of which is transportation" (I#90).

While the view of high transportation charges for imported food acting as a boost to local production was commonly held by participant farmers, food traders noted that frequent shipping movements by sea and air, and consolidated shipping costs, often resulted in highly

competitive landed cost prices into the Maldives (O#141). They further queried the validity of the farmers contention in view of the 90% importation of the national food requirement. However, the participant traders conceded that it would be cheaper to produce items such as lettuce in the Maldives due to the high transport cost associated with its specialist packaging requirements (O#141).

Twelve participants noted high domestic transportation costs from the Male' hub market to island communities irrespective of where the produce was sourced. They noted that while domestic transportation charges were dependent upon the routing and frequency of ferry services, some islands with customs clearing facilities could land goods from southern India at a cheaper rate than transporting the produce from Male' (15 references). In a discussion with five participant farmers on a relatively remote inhabited island, one participant noted: "If we could clear goods on our island, we would import directly from Lanka and India. It would be cheaper than paying the ferry charge from Male'" (I#14).

## Code summary

Box 6 presents key points to emerge from Code 6, *Farmers believe that reducing food imports will boost local production.*

**Box 6. Key points from code 6**

- **Self-sufficiency and new crops:** Participants believed that the Maldives could produce greater quantities of the food it was currently producing and trial new crops particularly for the tourist sector. Participants accepted that despite self-sufficiency being achieved in some crops, imported food would always be required particularly in servicing the tourist sector.
- **Food imports preferred by traders:** Participant farmers noted that the food trader's preference for imported food supplies dampened their enthusiasm to expand production. Traders stated that it was easier to deal with external food suppliers as they could supply what the market required and at a competitive price.
- **Lower production costs associated with foreign farmers:** Participant farmers argued that they could not compete with the low production costs enjoyed by Sri Lankan and Indian farmers. This hindered their attempts at farming.
- **Control of food imports through duties and quota's:** Participants noted that the GoM should boost local production by imposing import duties and quota's. This would protect farmers against surpluses of cheaper dumped food imports. MoFA countered that only traders would benefit from such protectionist moves.
- **Reduced transportation costs would boost local production**: Participant farmers argued that local production would reduce high transportation costs associated with imported food. This rationale would appear unsupported by most food traders, with 90% of the national food requirement currently being imported.

**Code 7** **Key production challenges include knowledge gaps in best practice farming, and limited accessibility to technology, farming inputs, land, and funding.**

**Table 11. Code 7**

***Key production challenges include knowledge gaps in best practice farming, and limited accessibility to technology, farming inputs, land, and funding.***

| Code: 7 | Subcode: 7a, 7b, 7c, 7d, 7e, 7f, 7g. | | No. of participants. | No. of references. |
|---|---|---|---|---|
| ***Key production challenges include knowledge gaps in best practice farming, and limited accessibility to technology, farming inputs, land, and funding.*** | 7a | *Knowledge gaps in the use of pesticides and fertilisers.* | 102 | 290 |
| | 7b | *The negative impact of changing weather patterns on crop production, and its links to climate change* | 101 | 272 |
| | 7c | *Transient technology: Tried, tested, used, and sometimes discarded.* | 100 | 238 |
| | 7d | *Limited access to farming inputs including: equipment; pesticides; seeds; and fertilizers.* | 85 | 166 |
| | 7e | *Land constraints: availability; underutilisation; water resources; and, unsecured tenure.* | 79 | 151 |
| | 7f | *Commercialisation of production.* | 62 | 100 |
| | 7g | *Poor access to funding restricts farming.* | 57 | 119 |
| | | ***Total:**<br>* Any individual participant may have mentioned a theme more than once (or) on multiple occasions during the interview/focus group.* | **586** | **1,336** |

## Code introduction

Code 7 provided the most participant responses of any code in this research as it elicited the farmers' views on the main production barriers to agriculture in the Maldives. Some of the issues in this code overlapped with issues in other codes; however, care was taken to avoid repetition, and highlight the specificity of all issues raised by participants. Participant responses focussed on a lack of accessibility to a variety of factors which influenced their productive capacity. These included: agricultural knowledge on best practice farming; affordable and reliable farming inputs such as seeds, fertilisers, and pesticides; technological advance to assist in production processes; available land; and, funding for investment. Participants demonstrated their understanding of accessibility to be governed by affordability and availability, two factors which featured at length in most of the participant responses contributing to this code.

**Subcode 7a: *Knowledge gaps in the use of pesticides and fertilisers.***

Agricultural knowledge deficits amongst students have previously been discussed in subcode 5c, *Teachers wanted more agricultural learning in schools*. However, agricultural knowledge deficits extended across the gamut of agricultural life in the Maldives with the indiscriminate use of chemical pesticides, and to a lesser extent, synthetic fertilisers, being

of particular concern to participant farmers (102 participants, 290 references). Concern focussed on the use of both products in terms of their efficacy, and pollutant effect on soil, water, marine and terrestrial biodiversity, and human health.

**Pesticide usage:** Twenty-eight participant farmers stated that most farmers in the Maldives were aware of the pests and diseases that attacked specific crops but were unaware of either preventative or remedial action to combat such intrusion. Where pest intrusion occurred, the typical response involved the excessive spraying of chemical pesticides onto the affected plants until the intrusion subsided, albeit usually on a temporary basis (30 references). A participant farmer on a large agricultural island commented on this predicament when he noted:

> The biggest problem is the diamondback moth, which is out of control on this island. It eats all the cabbage, broccoli and cauliflower. We spray lots of chemicals until it is gone, but sometimes it will come back. The crop usually suffers a lot. We do not know how to control this problem (I#75).

In addition to excessive pesticide dosages being applied, thirty-two participants noted that farmers were unsure if they were using the most appropriate chemicals, banned chemicals, and whether the correct handling and storage guidelines were being adhered to (47 references). A participant MoFA official commented noted that farmers' failure to acknowledge or understand the prescribed guidelines for pesticide application often resulted in either a continuation of the pest problem, and or the failure of the crop due to pesticide poisoning (I#10). He further posited that: "If the instructions for usage are in a foreign language, farmers just do not understand it. This happens especially with the Bangladeshi labourers who do most of the farming work in the Maldives" (I#10).

**Agro dealers distributing pesticides:** All of the nine participant agro dealers in this research noted they did not sell banned chemicals to Maldivian farmers, despite some of the chemicals being used in India (12 references). However, five participant agro dealers suspected that such chemicals could find their way onto Maldivian farms (5 references). In terms of usage instructions for pesticides, one participant agro dealer noted that although he provided translated leaflets in the Dhivehi language to his farming customers regarding the pesticides properties, application process, and storage requirements, farmers did not always take these recommendations into account (I#107). He added that farmers would sometimes just rely on the advice of farming friends experiencing similar pest challenges, even though the pest challenges may be unrelated (I#107).

**Acknowledging the problem of pesticide pollution and finding solutions:** The majority of participant farmers in this research acknowledged the agricultural knowledge deficit relating to pesticide and fertiliser usage and had requested MoFA to provide training and demonstrations on pest control and pesticide usage (O#94). In a discussion with four participant farmers, one noted: "We need awareness about what to do about pests, and what chemicals to use, and how to use them. We need some experts from outside[40] to come and tell us how to work with chemicals" (D#19). Countering the call for experts, outside or otherwise, a meeting with eight elderly farmers noted that before experts were on hand to address the pest concerns, traditional pest control methods were employed (O#152). A participant farmer elaborated:

> We always had pest problems on our island, so we used to grow tobacco leaves, soak them in water, and spread the tobacco water around the plants. This got rid of a lot of insects. These are old methods that farmers used on the islands in olden times, but now people forget about them and just use the chemicals (I#121).

The manager of a commercial agricultural island similarly recounted his use of traditional pest control methods in the control of white fly attacking his lettuce, tomatoes, and melons. He noted that he had applied frequent spraying of soapy water and neem oil on the plants which had worked well, was kinder to the environment, and was less expensive than chemicals(I#20).

A participant MoFA official further explained that MoFA organised awareness programmes in safe pesticide usage and training on integrated pest management (IPM) through their extension services. However, the official commented that although the farmers attended the training courses and agreed with the recommendations, most farmers continued to use chemicals. He noted: "The farmers will keep spraying chemicals because they think it is a quicker solution for pest control than IPM. At the back of their mind is the money they will lose if the IPM takes too long to work, so they will keep spraying" (I#122). Reaffirming this sentiment, one participant farmer noted: "We also know that Albamycin and Deltamethrin[41] will get rid of the insects for us quickly" (I#14).

**Public health concern over pesticide usage:** Thirty-five participant farmers voiced concern over the perceived threats to public health from food contaminated by either unsafe or overused pesticides (50 references). Concern focussed on the perception that residual chemicals

[40] Reference to outside experts was made repeatedly in this research and inferred that experts from outside the Maldives had superior knowledge to that of local experts (O#94).

[41] Widely used insecticides in the Maldives.

from pesticide spray would be absorbed into the food chain and passed onto consumers causing food poisoning and longer-term conditions such as cancer (O#146). In support of this concern, a participant farmer utilising hydroponic technology noted:

> Because we use so many chemical pesticides, we need to be guided on how to use them properly. Too many of these chemicals are not good for human health, but we do not know if the chemical is creeping into our bodies in small amounts, and then the problem, like cancer, will come when we are old. In many ways, we are afraid to use the chemicals, but still we do (I#71).

Chemical air drift was of further concern to a participant commercial farmer who noted: "The breezy weather blows the chemical sprays into our houses which is not good for our health" (I#126).

Of the twenty participant health practitioners interviewed in this research, all noted that whilst referrals for food poisoning occurred, there was no evidential link to suggest pesticide usage in food production was the cause. However, eleven of the health practitioners did note that farmers commonly experienced skin irritations during and after spraying pesticides (12 references) (O#148).

An outlier comment from a participant food distributor based in Male' provided an interesting view of chemical usage in food being sold in the Male' market. He noted that the public in Male' were becoming increasingly suspicious of perfectly formed, blemish free produce, believing it to be chemically enhanced and, therefore, unhealthy for human consumption (I#102).

**The negative impact on biodiversity from pesticides:** Discussion of the depletion of marine and terrestrial biodiversity from agricultural pollution did not feature in any great measure within this study (8 participants, 10 references). More specifically, there was little mention of preserving natural predators to combat invasive pests despite the efforts of MoFA to provide this information. However, an outlier comment from a participant farmer did comment on the need to preserve insect life when she noted: "When I was young my farther told me which were the good insects, and how they would eat the bad insects. Now they use chemicals to control all pests, and I suppose they kill the good and bad insects together" (I#121).

**Synthetic fertiliser usage:** Forty-four participant farmers in this research articulated their strong support for the use of synthetic fertilisers, stating that they were familiar with how to use the fertilisers, and what results could be expected (61 references). In an interview with two

participant farmers on an island with a very small amount of farming land, one of the farmers explained:

> We use lots of chemicals here. We can cut growing times by five days on some salads by using the Grow More and Albert's Solutions. We know how good the NPK [Nitrogen, Phosphorous, Potassium) fertilizers are. NPK fertilisers work quicker than organic fertilisers and they cost about the same here (I#14).

Eighteen participant farmers added that fertilisers were needed to condition the poor soil quality due to its high calciferous content, porous sandy composition, and micronutrient deficiencies (20 references). As noted by an ex-commercial farmer participant: "The soil condition in the Maldives is very poor. It's like trying to farm on a sand bank. For this farming, we need lots of fertiliser, otherwise we have to farm in greenhouses using the hydroponics" (I#104). However, one of the participant farmer noted: "The soil is better in the middle of the island because it goes down deeper before the coral layer, and it is a dark rich colour" (I#45). In commenting on the overuse of soil, particularly on islands where limited farming land was available, a participant island councillor noted: "Because our land is so small for farming, we never rest it, we just keep on planting. So, we suck all the goodness out of the soil. That's why we need lots of fertiliser" (I#15). A participant MoFA official noted: "We have talked about the bush fallow system to farmers, but nothing really happens" (I#120).

Despite the affirmation of synthetic fertiliser, thirty-one participants were concerned about its over usage (34 references). In an interview with a school environmental club, the three participant students all noted the polluting effect of fertilizers on their island's lakes. One student explained: "Our farmers use too much fertiliser, and it runs into our lake where the nitrogen builds up and damages the life of the lake" (I#64). A participant farmer further commented on the damage to coastal waters on his island: "Now we can see our lagoons have much more algae in them, and we think it is from fertilisers coming from the fields. We need to know more about this so we can manage it better" (I#69). In terms of the pollutant effect upon soil from the overuse of synthetic fertilisers, a discussion with a group of six young participant farmers noted that MoFA had visited their island and told them to rest the soil and reduce fertiliser usage. One of the group commented: "Actually, we know we are making many mistakes with fertilisers for farming by using too much and the wrong ones. We also don't know the best way to use them" (D#21).

**Organic fertiliser usage:** Unsterilized cow dung was cited by the nine agro dealers as the main organic fertiliser used in the Maldives (13 references). The agro dealers estimated that in

excess of 50,000 tonnes was imported annually, mainly from South India. In the absence of any significant livestock sector in the Maldives, animal dung was not locally available. The imported dung was popular with farmers as it was affordable and available in most islands. Further, there were no adverse effects recorded from its use (O#124). However, three participants in the research highlighted the risk of unsterilized organic fertiliser being a vector for the transmission of harmful pathogens and invasive species (7 references). One of the three participants who was a MoFA official, noted: "We get this dung because we have little livestock in this country. Unfortunately, we cannot monitor whether it is bringing harmful insects and diseases into Maldives" (I#120).

**Composting:** The process of composting, and its benefits as a fertiliser were mentioned by forty-eight participant farmers (51 references). However, twenty-one farmers noted that they were not composting themselves, but were thinking of doing so if they had sufficient knowledge on how to compost correctly (23 references). As commented upon by a participant farmer and fish processor: "The farmers still need to know how to make their own compost. There are so many leaves and empty husks from the coconut plantations they could use. They should also use the fish waste" (I#109).

In response to the commentary that farmers were potentially enthusiastic composters but lacked the knowledge on how to undertake composting, a participant MoFA official noted that numerous teaching and training programmes for farmers targeting composting had been undertaken (I#129). The MoFA official continued: "Composting is at the core of best production practice, so in virtually all our meetings with farmers, we stress the least cost and environmental benefits of composting" (I#129). Supporting the input of MoFA in advocating composting, fifteen participant farmers noted that they were composting as a result of MoFA's guidance on the subject (30 references). They further noted that they were using not only island vegetative waste, but also fish waste from the daily catches, and food waste from households, schools, hospitals, and restaurants (18 references). A further comment from a participant farmer noted: "I do my own composting, and I tell other farmers to do the same because it works and is cheaper than fertiliser from the shops. The problem is it takes too long to make compost, and farmers want a quick solution so they buy fertiliser" (I#1).

Familiarity of composting extended to resorts and community composting schemes on inhabited islands. Twelve out of the nineteen resorts visited in this research were actively engaged in composting programmes. A participant environmental manager of a resort

recounted the process involved in composting, and further added that the resort regularly invited farmers from neighbouring islands to view this process. He added: "We have also given the farmers some bags of compost and they are very happy with it" (I#137). In terms of community composting, one island visited during the fieldwork had established a communal composting scheme where island waste was collected, sorted, and processed. The participant island councillor in charge of this scheme noted that biodegradable waste was composted and could be used by islanders as a fertiliser for their household gardens and field plots. A user fee of MVR100 (  5) per month was charged for the waste collection, and the compost was available to the community free of charge (O#112).

**Subcode 7b: The negative impact of changing weather patterns on crop production, and its links to climate change.**

**Changing weather patterns:** Changing weather patterns and their negative affect upon farming were widely commented upon in this research as participant farmers noted that during the last five to ten years, rainy seasons had become dryer and traditionally dry seasons had often experienced violent storms with heavy rain and strong winds (101 participants, 272 references). It was further observed that periods of increased heat were evident often resulting in drought conditions on some of the islands in the north of Maldives (O#2). Commenting upon the changes in traditional weather patterns, three elderly participant farmers during an evening conversation in their fields, noted that that the two monsoons guiding the traditional planting and harvesting *Nakaiy* calendar, had become unpredictable in their frequency and intensity (O#2). They observed that the *Hulhangu* hot and wet south-west monsoon from April to November used for planting, and the *Iruvai* hot and dry north-east monsoon running from December to March for harvesting, had altered significantly confusing them as to what planting and harvesting schedule to adopt (O#2).

Twenty-four participant farmers in this research noted that increased rainfall had caused flooding and flattening of crops especially in the south of the country (26 references). The participants further noted the correlation between increased rainfall and the increased incidence of fungus outbreaks. One of the participants commented: "Suddenly it will start to rain for a long time, and the fungus will come. It spreads very quickly, and we have to spend a lot of money on the medicine to try and get rid of it" (I#74). A participant commercial farmer commented upon the changing weather when she observed:

> All the weather is now mixed up. The weather has changed with lots more rain and very hot spells. We are now not sure when the best time to plant is. For the last two years it was dry

> after we planted, and very wet when we were trying to harvest. We think it will be the same next year, so we are not sure if we should follow the Nakaiy anymore (I#133).

In mitigating the effects of increased extreme weather, a participant cooperative member and farmer noted: "I have grown some strong trees and bushes around my crops so the wind will not come straight onto the crops. So now I don't have too much damage from the wind" (I#70). Five participant farmers added that greenhouses utilising hydroponic systems would also offer protection against wind and flooding (8 references). However, three of the participants noted that storms had caused considerable damage to the coverings of the greenhouses rendering them unusable. They noted that as there was no funding to repair the broken coverings the greenhouses remained non-operational (O#3).

A MoFA official acknowledged that the traditional *Nakaiy* planting and harvesting calendar had been disrupted by changing weather patterns and suggested that the only option available to farmers now was a long-range forecast from the metrological office; although this was not always accurate in its predictions (I#125).

Whilst the majority of participant farmers in this research believed that weather patterns were changing, twenty-four participant farmers observed that they did not think there was any significant weather change (28 references). Representative of this thinking was a discussion with four participant farmers who all agreed that sudden storm surges, periodic flooding, and episodes of intense heat, had been part of Maldivian weather patterns for the last sixty years (D#19). The participants added that the only exception was the 2004 tsunami, but even the freshwater lenses on the islands had recovered from saltwater inundation after a period of seven months. They concluded that despite periodic extremes in weather, nature had a habit of maintaining normalcy in the weather for Maldivian farmers.

Adding to the preceding commentary, seventeen participant farmers noted that the Maldives had an excellent climate for farming with warm temperatures, cool breezes, and light rains that could make anything grow (22 references). One participant farmer in the north of the country noted: "You know we can even grow pineapples here now. We are growing them in pots. It's very easy. The climate is good for us" (I#25). Further comment on the favourable farming climate came from a participant resort chef /food trader who noted: "We are now producing so many new items like cauliflower, broccoli, and asparagus. We didn't ever think we could grow those things here" (I#80).

**Understanding climate change:** Whilst changes to the *Nakaiy* calendar were widely noted in the research, there were few references to climate change being a possible influence (10

(15 references). A participant MoFA official suggested that although many farmers had heard the term 'climate change', they were unsure how or why this linked with changing weather patterns that impacted upon their farming (I#120). The MoFA official added that use of the term 'climate change' had in some instances become a default explanation for the effects of all bad weather experienced by farmers such as rough seas in transporting cargo from the production islands to the market.

In discussing the farmers perception of climate change, three participant environmental club students noted that unless farmers could visualise the link between the causes and effects of climate change, they would tend to discount its potential impact upon their farming activity (I#64). This sentiment was confirmed by a participant school principal: "Only big problems like flooding that people can see will make people think about this climate change. Otherwise, they just think it is normal weather even if it is bad (I#41). A participant environmental teacher appeared to reinforce this thinking in his thoughts on sea level rise: "People say the Maldives will vanish due to sea level rise, but it is very difficult even for me to believe this will happen" (I#32).

In the case of the widespread coastal erosion in the Maldives, the effects were frequently recounted by participants in this research, although not explicitly linked to the influences of climate change. In discussing coastal erosion, twelve participant farmers commented on the erosion of coastal vegetation lines around their island (15 references), and one participant commercial farmer noted: "I think we must have lost about twenty feet from all around this island due to washing away. A lot of the bushes have also gone in the sea (I#20). Rather than the effects of climate change, participants more associated coastal erosion with a pattern of seasonal erosion and accretion where coastal sand mass moved from one area of the island to another area (O#101).

**Subcode 7c: *Transient technology: tried, tested, used, and sometimes discarded.***

References to the use of technology in order to assist Maldivian farmers generate profit and encourage youth participation in agriculture have already been discussed in this chapter. However, this section addresses participant responses concerning what technology was used, how it was applied, and what outcomes were evident (100 participants, 238 references).

**Hydronic cultivation in greenhouses:** The main hydroponic systems used in the Maldives was the Autopot system where seedlings were transferred to contained pots fed by liquid growth supplements. Growing in coco peat bags was also widespread where watering was

undertaken through drip irrigation. Both systems were typically housed in poly tunnel greenhouses affording some protection from pests and inclement weather. Drip irrigation was also employed for plants grown outside of greenhouses and protected by shade cloth (O#92).

The introduction of hydroponic cultivation in greenhouses came mainly from the commercial agricultural sector and MoFA from 2005 onwards. Both parties believed that the production of the high value niche crops such as salad items, could be supplied to the increasing tourist sector and in turn generate a profit for farmers. Crops grown under hydroponic cultivation included: tomatoes, cucumber, lettuces, and sweet and rock melon (O#92).

A participant commercial farmer relayed his experience of hydroponic cultivation noting that its operation was easier to manage that conventional field farming although the capital outlay could be high as desalinated water had to be generated in time of poor rainwater harvesting (I#102). The farmer further noted that he was happy to share his experiences with fellow farmers and encouraged MoFA to bring other farmers to view his efforts. One participant commercial farmer undertook such a visit and noted: "That big island in the north works well with hydroponics. So, we thought to try this ourselves also. We leased an agricultural island and we constructed thirty-six greenhouses with the hydroponic systems to grow lettuce and melons" (I#97).

Between 2008-2010, MoFA, with its development partner the United Nations Development Programme, introduced the autopot project to five islands where each island received four greenhouses with accompanying hydroponic equipment. The project included off site training in hydroponic cultivation in Malaysia, supplies of nutrient feeding solutions and technical assistance from MoFA. A participant MoFA official noted that the project worked well for a short time after MoFA completed its yearlong assistance to the project. However, the project started to fail due to mismanagement and infighting amongst the members of the organisation operating the project. The official noted:

> In the end nobody did anything, and the crops were not replanted. All twenty of the greenhouses in this programme are now deserted, with their netting all torn to shreds by the wind. There is no money for repairs. These people just want to fight each other to stop others having any benefit. A lot of jealousy is there. We were very disappointed by this outcome (I#122).

An account of a similar MoFA intervention came from a participant farmer on a large agricultural island. The farmer noted that a pilot community hydroponic system was

launched and was successful for a few crop cycles. However, he recalled that farmers did not fully understand how the hydroponic system worked, and believed it was expensive and inconvenient to operate compared to conventional cropping which worked well on their island (O#24).

Whilst production in the greenhouses was successful under the guidance of MoFA, production invariably ceased once MoFA exited the interventions. Despite this disappointing outcome, nineteen participant farmers noted that the greenhouse projects had created awareness on different farming methods that could be used in the Maldives (23 references). The participants further noted that they had been encouraged to construct their own smaller greenhouses with an adapted hydroponic system utilising local plastic piping and plastic pots (O#109). In a discussion with seven Bangladeshi farm labourers, five agreed that the introduction of growing plants in pots inside a greenhouse was a good idea as it had reduced pest intrusion and disease outbreaks (D#22). In an interview with two young participant farmers on a large agricultural island, the desire to experiment with hydroponic cultivation was noted: "We are using shade cloth for the chilli production now, but we want to try and test hydroponics in the correct greenhouses" (I#54). Throughout this research, participants displayed an interest agricultural experimentation concerning crops and equipment in order to find what worked best for them on their farms (17 participants, 20 references).

In concluding this subcode, it appeared that there was an appetite for technological advancement in Maldivian agriculture in the form of greenhouses containing hydroponic cultivation systems. However, the participant responses revealed that the technology was largely a transient phenomenon for the majority of community farming structures, as much of it fell into disrepair once the technical assistance from MoFA had ended. The data further revealed that this transitory phenomenon did not usually apply to individual farmers, who instead adopted, and indeed adapted, the technology to embark upon their own hydronic cultivation ventures.

**Subcode 7d:** ***Limited access to farming inputs including: equipment; pesticides; seeds; and, fertilisers.***

Eighty-five participants in this sub code noted limited access to farming inputs including: equipment; pesticides; seeds; and, fertilisers, with pesticides and fertilisers in particular demand (166 references). As previously mentioned in this chapter, participants defined accessibility in terms of affordability and availability.

**Demotivating effect of high farming input costs upon farming activity:** Many participant farmers in this research appeared demotivated by the high price of inputs costs set against the usually low market prices achieved for their produce (O#138). During a discussion with five participant farmers, one of the farmers noted:

> The problem is that the costs for pesticides and fertilisers have all risen, but the price we sell our food has not. We have very little margin now. So why should we work so hard in the hot sun and not get any money at the end? In the end farming is not worth doing if we cannot get anything from it (D#10).

A discussion with five fishermen from a fishermen's cooperative concurred with the preceding commentary when they observed that their farming friends were constantly complaining about high input costs set against low market prices. The chairman of the cooperative noted that his friends should rather engage in fishing activity: "With fishing, our activity is quick and our return is quick. We catch a fish and sell it the same day and get the money. We don't need any of these inputs. All we need is the sea" (D#15).

**High transportation cost for imported inputs:** Mention of high transportation costs was made in subcode 6e, *High transportation costs associated with food imports should stimulate local production where lower transportation costs are achievable.* In this section, twenty-five participant farmers noted that the high cost of farming inputs were mainly attributed to regional transportation costs associated with inputs from India, Sri Lanka, Malaysia, and Thailand (29 references). Eighteen participants out of the twenty-five went on to note that domestic transportation costs for inputs were also expensive, especially when transporting from Male' to the far northern and southern atolls (18 references).

In an interview with two participant island council officials on a large agricultural island in the north of the Maldives, one of the councillors summed up farmers dissatisfaction over high transportation costs for imported farming inputs:

> We also have to pay for the import duty on goods, the local ferry cost to get the products to our island, and then the mark up of the agro dealer. The farmers in Sri Lanka can buy the Uni Grow[42] products nearly 30% cheaper than we can because of all our transport costs. It doesn't matter if we buy in Male' from the big agro dealers, or from our island shop, or import ourselves, we still have the high transport cost (I#18).

Addressing the point of expensive domestic transportation costs for inputs, a participant commercial food distributor noted that the main routes between Male' and the large urban centres in the north and south of the country could provide competitive cargo rates due to

[42] Uni Grow is a popular soil nutrient produced in Sri Lanka and marketed in the Maldives.

high volumes of cargo traffic served by private and government ferry services. However, onward transportation to islands from the regional transport hubs could be more expensive due to their infrequency and smaller cargo loads(I#8).

**Agro dealers control of farming input pricing and availability:** The majority of participant farmers in this research expressed some disquiet over the lack of agro dealers in the Maldives, noting that more agro dealers would provide a more competitive service. Participant farmers noted that the small number of agro dealers maintained what were perceived to be high prices and limited stock availability of farming inputs (O#135). In an interview with a participant commercial farmer, he agreed that subsistent farmers found input costs prohibitively high. He noted: "There should be more agro dealers otherwise the existing ones will become greedy. Our company can do this farming input supply. We can supply our farm and other farmers at a good price" (I#109).

In partial validation of the disquiet over limited agro dealer service in the Maldives, it was observed that only two out of twenty inhabited islands visited had more than one agro dealer located on the island, and five of the inhabited islands visited had no agro dealer shops at all (O#135). However, it was observed that there had been a minor proliferation of agro dealer shops in Male' over the last three years, with seven shops noted in this research (O#135).

Whilst shortages of agro dealer shops were noted on many islands, a discussion with five agricultural cooperative members on a large and relatively isolated agricultural island noted that they had four agro shops on their island where they could obtain the most of the inputs they required (D#9). It would appear that the limitations of trading goods in relation to their isolation was self-acknowledged by the community and accommodated through forward planning. This included advance stocking of farming inputs for the island's farmers (D#9).

In response to accusations of high prices for farming inputs, six out of the nine agro dealers interviewed in this research noted that the costs of the products from the external suppliers had risen in part due to higher transportation costs (8 references). One participant agro dealer explained how United States dollar shortages in the Maldives had acerbated the problem. He noted: "We have to buy the inputs in US dollars and sell them here in Rufiyaa. So, it is difficult to get dollars from the bank or other places to buy imports. The farmers can bring inputs themselves, and then they will see how expensive it is (I#108).

A participant farmer and island councillor noted that the cost of farming inputs, particularly fertilisers, could be mitigated through local composting. He added that coco peat bags could also be produced in the Maldives (I#50). In terms of a more judicious management of purchased inputs, a participant farmer on a large agricultural island noted: "Of course the farmers' pesticide and fertiliser cost is too high, because they are using far too much. They don't need to use half the amount they do. If they cut down they will save a lot of money" (I#87).

One of the largest participant agro dealers based in Male' elaborated on how his company had attempted to increase the availability of farming inputs on the islands by appointing local agents to sell their products (I#101). The agro dealer noted that the local agent would receive training from the agro dealer on the products and equipment being sold, and pass this onto the island farmers. He noted that this training encouraged sales and established how to correctly administer hazardous products such as pesticides (I#101).

An outlier comment from a participant agro dealer concludes this section when he commented on the lack of foresight by many agro dealer colleagues in anticipating farmers' input requirements. He attributed this short-sightedness to the fact that most agro dealers were businessmen and not farmers, whereas he was involved in both activities. He noted: "Because I am a farmer, I know what other farmers want for planting and growing, and how much they can afford to pay for it. Other agro dealers do not always know this information because they are not farmers" (I#70).

**Farming inputs supplied by MoFA projects:** Farming equipment and inputs often accompanied the pilot project interventions undertaken by MoFA and its donor partners (O#109). An example of this input assistance was observed with the MoFA/Food and Agricultural Organisation TeleFood egg laying projects. These projects targeted community groups and were provided with poultry housing, equipment (drinkers, feeders, nest boxes), day old chicks, vaccine/medication, feed and technical expertise at the beginning of the project, with consumables such as vaccine, feed and technical expertise continuing throughout the first twelve month period (O#139). Unfortunately, on the completion of the MoFA assistance, the project soon closed as there were logistical difficulties in obtaining imported poultry feed.

A similar outcome was noted with the MoFA/International Fund for Agricultural Development's, Fisheries and Agricultural Diversification Programme (FADiP), where FADiP

cooperatives were supposed to stock farming inputs for sale to farmers at affordable prices. This initiative had a limited impact as noted by one participant cooperative official: "The co-op started supplying seeds and fertilisers, and then there was some funny business, and now there is nothing. They don't sell anything anymore" (I#75). This sentiment was commonly voiced amongst those participant farmers who had worked with FADiP cooperatives.

**Subcode 7e:** ***Land constraints: availability; underutilisation; water resources; and, unsecured tenure.***

Within this subcode, seventy-nine participants discussed issues relating to agricultural land on inhabited and uninhabited islands (151 references).

**Availability:** Sixteen participants within this research stated that the Maldives was not an agricultural nation due to its small, fragmented, and highly dispersed coralline landmass (19 references). In a discussion with eight participant members of a youth organisation, one member reflected the consensus of the meeting when she noted:

> The Maldives is not cut out for farming. For farming you need land as the first thing. The land should have good soil and water to feed it. We do not have this here. We are a fishing country, even though we have always grown items to feed ourselves. Did you know that 99% of this country is underwater? How can this be an agriculture country like Sri Lanka then? (D#11)

Commenting on the assertion that the Maldives had an insufficient natural resource base to accommodate agriculture, a participant MoFA official noted that farmers often believed they needed large areas of land in order to generate sufficient profit to keep their farms going. The official added that some farmers did not consider greenhouse production where smaller land areas were required, or the significant areas of abandoned farmland on many islands (I#125). Concurring with this sentiment, fifty-one participants noted that there was sufficient land to accommodate smaller farming ventures in the Maldives, with much of the farmland remaining empty (79 references). As noted in a discussion by the participant secretary of a women's development committee: "We even have enough land here on our small island to give out field plots to farmers. Not a lot of people want to do the farming, so plenty of land is there" (D27).

On eighteen out of the twenty inhabited islands visited during this fieldwork, the respective island councils indicated that there was available agricultural land. The island councillors further noted that because their islands were of a considerable distance from the Male' market for selling produce, many islanders believed that farming was unprofitable and, therefore, not worth pursuing (O#149). The two remaining inhabited islands visited in the

fieldwork that were both within close proximity to the Male' market noted shortages in available farmland due to strong demand by existing island farmers (O#149). On one of the islands, the president of the island council commented:

> We like to give everybody the land that they want, but we do not have enough, so we are giving people plots which are about 100' x 25'. If there is five members in a family that want to farm, they can try and get their plots next to each other and make one big family field. Then we have the grassland that is left empty until three months before Ramadan when we let people have this land to grow mainly watermelon for Ramadan (I#30).

In terms island land use plans, only five island councils confirmed they had a land use plan which demarcated land areas for farming. Out of the five councils, only two island councils said they were enforcing the plan due to the strong demand for building land by the expanding island community. The remaining three island councils alluded to their demarcation of agricultural land as a work in progress (O#149).

**Underutilisation:** This issue of land underutilisation was discussed by twenty-nine participants in this study, and mainly related to allocated farmland that was not being used and instead left fallow (41 references). As noted in a discussion by a participant cooperative member: "It is the case that most of the agricultural land is given out already, but a lot of that land is lying empty because the farmers are too lazy to farm. So, the land is not being used for farming even though it is farming land" (D#9).

Many participant island council officials in this research discussed the issue of underutilised farmland and measures to correct this situation. They noted that forfeiture of the land by the island council was enforceable although it was unclear how many island councils had pursued this option (O#149). In a discussion with three participant farmers and the president of the island council, the president noted: "If the farmer has been working his land for three to four years and then he stops for a couple of years, we will take the land back from him and give it to someone new" (D#19). He went on to note that although there were sometimes complaints from the evictees, the island council judged this to be a logical action, particularly if there were other farmers who wanted the land to farm. Another island council president noted that they would repossess unused farming land after an inactive period of six months (I#40).

A participant farmer from a large agricultural island summed up the feelings of many active participant farmers on the subject of underutilised land when he noted:

> The farmers always complain about how little land there is for farming. They believe they are entitled to land whether they use it or not. When they get the land, you will find only grass.

> Useless grass. They will never go ahead with farming because it is difficult hard work…you cannot do farming like this (I#70).

Underutilised commercial agricultural islands followed suit in terms of farming inactivity resulting in their forfeiture by MoFA. A participant MoFA official noted that land was a scarce natural resource in the Maldives and should be utilised for its intended purpose or returned to the state and given to a party that would undertake commercial agriculture (I#120). The official continued that in the past, wealthy businessmen had taken whole islands on agricultural leases as a status symbol where they would build a large family house for holidays or try and convert the agricultural lease to a tourist resort lease (I#120). The official added they often had little intention of farming commercially. MoFA now monitored this situation carefully through periodic site inspections and required report submissions from the lessee.

**Water resources:** Thirty-seven participant farmers noted that the freshwater from the underground freshwater lens was plentiful, and usually of an acceptable salinity for irrigating field crops, and for use in hydroponic systems (47 references). However, they did acknowledge that the freshwater became periodically salty in the event of high tides or prolonged periods without rain as they observed the leeching of saltwater into freshwater wells (O#66).

A further source of freshwater was rainwater harvesting which eighteen participant farmers noted as being preferable for hydroponic systems due to it being 'purer' (23 references). Participants noted that rainwater was harvested from rooftops and stored in Plasticized Polyvinyl Chloride (UPVC) water tanks adjoining housing, although not all farmers could afford the cost of UPVC water storage tanks (O#66). Two participant farmers further discussed harvesting rain from manmade ponds that were lined to prevent seepage. One noted: "We saw all the rain just falling on the island so we decided to make a pond. We lined it and covered it when it was full. It worked well until the next rains came and we filled it again" (I#126).

In contrast to the belief of adequate freshwater reserves for farming on most Maldivian islands, twenty-eight participant farmers noted that well water on their islands had a high degree of salinity, especially during the dry season, and was unfit for plant irrigation (34 references). They added that their islands were almost entirely dependent on rainfall for crop irrigation. A participant commercial farmer noted: "When the rains don't come, and the water is too salty, we have to give up farming because we cannot afford to get a

desalination plant for these low value crops" (I#104). A larger commercial farmer in the drier north of the country noted that poor rainfall had increased his reliance upon desalinated water to irrigate his hydroponic systems. He added that he was investigating solar powered desalination as diesel was becoming too expensive to purchase and transport to the island (I#102).

In controlling the use of freshwater for agriculture on islands, fifteen participant farmers noted that there was no island planning in terms of water extraction from freshwater lenses (18 references). They added that farmers could sink a well anywhere on their own land and use as much water as they wanted. A participant farmer with a hydroponic unit producing sweet melon noted: "There is no proper arrangement for taking water on this island. The government must control this otherwise we will have no water left to use" (I#71). A participant island council president added that the limited catchment area for rain on islands that were only a few hectares in size meant it was imperative for water to be used judiciously (I#29).

In the case of resort kitchen gardens, it was observed that ten out of the thirteen resorts that had kitchen gardens used a combination of rainwater and desalinated water for irrigation, and three of these resorts utilised treated sewage water for irrigating ground crops (O#130).

**Tenure arrangements:** Tenure arrangements for commercial agricultural islands were recorded in the form of agricultural leases where lease value, lease timeframe, proposed agricultural activities, payment terms, and so forth, were clearly noted (O#149). Although disputes between the lessor [MoFA] and lessees did arise, a participant MoFA official noted that the commercial agricultural lease tenure arrangement was far clearer than that of the land tenure arrangements between farmers and island councils on inhabited islands (I#125).

Twenty-four participants who farmed on inhabited islands agreed the inconsistencies between islands in allocating farmland (37 references). Participants noted land agreements ranged from verbal understandings with the island council office to more formal agreements recording the location and occupation terms that were often either forgotten about or ignored. One participant island councillor noted: "There are still have some field plots registered to farmers that died years ago" (I#24). The consistency that did exist in farmland distribution between most islands was no fee being charged in lieu of rent. Where land was available and there was a call for its use in agriculture, it was distributed on a first

come first served basis free of charge. An island council president in the north of the country elaborated on the land tenure arrangements on his island for farmland:

> We have enough land on our island so everybody can choose to have a plot in their house and in the fields. We give the land free of charge because it is for the family's survival so they can grow food for themselves. They can have the land for as long as they want. All they have to do is ask the island office, and if the land is free they can have it. It is a very easy process on this island" (I#23).

Despite the largesse exhibited by island councils in the distribution of farmland, nineteen of the twenty island councils visited in this research noted that they were considering introducing rents for field plots in the future; one island council had already introduced and enforced a nominal rent for farmland (O#119). A participant council president noted: "We are thinking 100 Rufiyaa [ 5] per year for 10,000 sq. ft. for farmland rent on our island" (I#40). A city councillor from a large agricultural island in the south of Maldives added: "There is a rule that you get farming land for 3 *laris*[43] per square foot, which means MVR600 [ 30] for 20,000 sq. ft. per year. At the moment, we are not implementing this rule because it may be too harsh for the farmers" (I#72).

During this research, it was observed that many participant farmers were silent on the issue of rent, possibly because they were aware of pending rent regulations by island councils(O#106). However, two commercial participant farmers noted that the introduction of rents should be accompanied by regulation stipulating fixed term tenancies and rents. They posited that this could commercialise subsistence farming to some extent whereby the formality of a land tenure agreement had to be accommodated in farmers planning. The farmers continued to note that a more secure land agreement would also promote land stewardship, whereby greater care was taken of the land by the farmers to ensure its long-term productivity for the term of their tenancy (I#110, 102).

**Subcode 7f: *Lack of commercialisation in agriculture.***

In this subcode, sixty-two participants commented on the need for commercialisation in agricultural production and marketing where subsistence and semi-subsistence farmers elevated their farming efforts to embrace commercial rationale (100 references). The majority of this commentary emanated from participant food customers who noted that capacity deficits in commercial acumen hindered the implementation of commercial approaches to both production and marketing.

[43] 100 lari's equals one Maldivian Rufiyaa.

**Commercial acumen:** Tourist and food trader participants believed local food production was unable to compete with food imports because there was the lack of commercial acumen in realising the potential of local production. A participant managing director of a resort chain validated this belief when he noted that subsistence and semi subsistence farmers needed to employ technology to build the intensive cultivation of high value niche crops in order to supply the tourist sector with food they were currently importing (I#105). Forty-five participants agreed that in order to supply commercial tourism, farmers also had to engage in commercial farming where efficiencies in production and economies of scale could be derived from the implementation of technological advances in agriculture (51 references). Participants added that if commercial acumen deficits amongst farmers could not be enhanced, farming would remain a subsistence and semi-subsistence activity rooted in rural livelihoods rather than commercial business.

Commenting on the lack of commercial acumen applied to agriculture, a participant food trader noted: "It's not surprising that there is a lack of business people in agriculture, because most of the business brains go to tourism where they can earn bigger money" (I#8). A participant island council president and trader further added: "Most of the people in Maldives farm just enough to supply their homes, and to sell on the island. Farming is not really a big business for them, they don't know how to do the business." (I#23).

A MoFA official agreed that commercialised tourism required commercialised agriculture to provide its food requirement (I#129). However, the official acknowledged that the majority of MoFA's efforts to elevate farming from a subsistence to a commercial had floundered: "The Ministry has given a lot of projects to farmers to try and make them more business-like in farming. So many greenhouses have been built with all the equipment, so many training courses. Most of the greenhouses are now all empty and broken, and farming is the same" (I#131). Another MoFA official contended that MoFA itself did not possess the commercial acumen to drive the commercialisation of agriculture, but such acumen did reside in the private sector. The official concluded that the best MoFA could hope to provide was a template in the form of pilot projects and training in how commercialisation options for Maldivian agriculture may benefit farmers (I#131). Validating this conclusion, one participant woman farmer noted: "I saw what they did in the big greenhouses with the hydroponics, and so I built a shade cloth greenhouse and used guttering for my water channels. This works so far" (I#74). It was further observed that some equipment salvaged from the past government initiatives such as irrigation networks, hydroponic distribution systems, and

cool store facilities had been secured by some farmers and were assisting in their production and marketing efforts (O#160).

In commenting upon why commercialisation strategies had not gained sufficient traction amongst subsistence and semi-subsistence farmers, a participant shopkeeper/farmer and cooperative member noted that farmers felt insecure in producing large quantities of one crop, especially if the customer reduced or cancelled orders at short notice (I#73). He continued that farmers believed the option of producing five or six crops in smaller quantities to sell to a variety of shops was a more secure option for their production. The participant noted: "Traditionally, farmers have usually been able to sell what they produce. Small amounts of many items. They don't trust that one party will always take a big amount of one item" (I#73). A participant NGO official added that farmer insecurity in commercialising agricultural activity also resided in caution concerning institutional commercialisation strategies. The official noted that farmers were often told of the benefits of commercialisation but were provided with little practical institutional support in advancing their commercialisation efforts (I#98).

**Offshoring commercialised agriculture:** Two participant businessmen noted that consideration should be given to offshoring commercial agriculture for the Maldivian food requirement (I#111, 103). Both noted that Sri Lanka was the obvious choice as it was an agriculturally-based economy with significantly lower production costs and enjoyed regular sea and air transportation links with the Maldives (6 references). One of the participants noted that he had purchased a farm in Sri Lanka and was already producing small amounts of avocado and potatoes for sale in the Maldives (I#111). Despite this offshoring initiative, the more widely practiced option of providing dedicated food supplies to Maldivian customers from Sri Lanka was already being exploited. During interviews at the 2015 Annual Farmers Day convention in Male', all of five Sri Lankan food trader participants interviewed noted that they provided dedicated food supplies exclusively to Maldivian customers for many years (9 references) (O#135).

**Subcode 7g: *Poor access to funding restricts farming.***

Fifty-seven participants highlighted poor accessibility to funding for agriculture in the Maldives (119 references). Participants defined accessibility in terms of affordability where interest rates and collateral requirements were too high for farmers to contemplate (35 participants, 71 references), and in terms of availability where local banks where indisposed toward

agricultural lending (28 participants, 53 references). A participant commercial farmer noted that poor accessibility to institutional funding for subsistence and semi-subsistence farmers was unsurprising since institutional lenders gravitated towards established high return, medium risk, sectors such as tourism and trade (I#115). The participant added that agriculture was regarded by lenders as a high-risk, low-return activity, mired in variables such as disease challenges and severe weather. Two bankers acknowledged that their banks' lending to the agricultural sector was less than 1% of their lending book (O#151).

Despite the dearth of institutional lending to the agricultural sector, a participant MoFA official noted that MoFA sometimes provided direct grants or low interest loans to support the start-up phase of projects (I#10). However, the MoFA official acknowledged that this was an increasingly rare option, with MoFA now using banks to facilitate the on-lending of donor funds to farmers (I#10). In these instances, the official noted that the funding would usually provide loans to farmers at concessionary interest rates with low collateral requirements (I#10). Commenting on this lending initiative, five participant farmers complained that the loans were difficult to access as the interest rates still ranged between 9%-12% which were unaffordable (D#20). They also noted that accessing this type of funding was very complicated in the criteria that had to be satisfied; these deterred farmers from borrowing. However, the five participants did concede that the collateral requirement could be considerably lower than the typical 100% coverage required through commercial lending (D#20). The participant MoFA official concluded that because the interest rates were not as low as the 5% requested by farmers, the disbursements of the loans were often disappointingly low (I#10).

A further concern expressed by participant farmers seeking funding through MoFA lending schemes was the upper limit on the amount of money that could be borrowed. A participant agro dealer contended that loan limits were too low:

> I think MoFA has money for farmers at around 9%, with a limit of approximately MVR46,000 [ 2,300] per farmer, but many farmers complain that the amount is too small, as a greenhouse will cost MVR463,000 [ 23,000]. Farmers say the interest should be at 5%, and MoFA should give more money for the loans (I#101).

An outlier comment from two participant members of a cooperative posited that the main reason for the dearth of agricultural lending was the lack of demand for agricultural borrowing (I#19). The participants elaborated, that most farmers on their island were reluctant or even frightened to borrow, as they knew that they may be unable to repay the lender on time and this would create a bad name for them in the community (I#19).

Participant farmers noted that the main impact of poor access to funding for agriculture was the slowing in expansion of existing crop production, and the trialling of new crop varieties, both anchored within the utilisation of new technology (30 participants, 35 references). Further comment from twenty-six participant farmers noted that the absence of bridging finance to assist periodic cash flow shortages, propelled some farmers to go out of business (32 references). A comment from a participant city counsellor encapsulated what many participants felt about the impact of poor access to funding for agriculture when he noted: "Little money equals low productivity" (I#72).

## Code summary

Box 7 presents the key points to emerge from Code 7, *Key production challenges include knowledge gaps in best practice farming, and limited accessibility to technology, farming inputs, land, and funding.*

**Box 7. Key points from code 7**

- **Knowledge gaps:** Knowledge gaps in participants use of chemical pesticides and synthetic fertilizers was noted. Gaps included knowledge about: product efficacy; application and storage protocols; and, negative impacts on human health, and soil and water resources. Alternative low cost localised options such as composting and integrated pest control were not widely practiced by farmers, as chemical products were perceived to provide quicker solutions.
- **Changing weather:** Changing weather patterns in the form of increased frequency and intensity of flooding from storms and hot temperatures from droughts were noted by participant farmers, but not linked to climate change. Some farmers argued that extreme variances in local weather patterns was a historical phenomenon.
- **Use of technology:** Hydroponic farming in poly tunnel greenhouses was supported by MoFA and practiced by many farmers. Hydroponic projects operated by cooperatives appeared to fail mainly due to poor management and infighting, whereas those operated by families, individuals, and commercial companies appeared to prosper.
- **Limited farming inputs:** Participants noted limited accessibility to farming inputs. Accessibility was defined in terms of high cost and poor availability. High cost related to the high transportation charges for imported inputs and onward domestic distribution to islands. Poor availability was ascribed to agro dealer manipulation of the market, the challenging logistics of serving a widely dispersed agricultural diaspora, and US dollar shortages.
- **Land constraints:** Participants noted that the Maldives was not typically geared for agriculture with its small landmass, porous alkaline soils, and limited freshwater reserves. Available farmland was underutilised where there either a lack of interest in farming, or it was sporadically farmed. Improved land tenure on inhabited islands with formal lease agreements was considered as improving land stewardship and capital investment in farming.

- **Lack of commercialisation in agriculture:** Resort participants and commercial food traders discussed the need for farmers to embrace commercial approaches to production and marketing. They noted that commercial tourism needed to be served by commercial food supply.
- **Funding constraints:** Participants noted limited institutional funding for agriculture as it was considered a high-risk, low-return venture complicated by a myriad of threats such as disease and severe weather. Poor accessibility to funding was discussed in terms of unaffordable interest rates, and a dearth of institutional lenders. MoFA provided some funding to farmers through banks but it was deemed complicated to access.

**Code 8** **Farmers have difficulty in connecting with the market in order to sell their produce.**

**Table 12. Code 8**

***Farmers have difficulty in connecting with the market in order to sell their produce.***

| **Code 8.** | **Subcode: 8a, 8b, 8c, 8d, 8e.** | | **No. of participants.** | **No. of references.** |
|---|---|---|---|---|
| ***Farmers have difficulty in connecting with the market in order to sell their produce.*** | 8a | *Catchall phrase: "Market is the main problem" for selling produce*<br>*Catchall phrase: "Market is OK" for selling produce* | 58<br><br>29<br>87 | 63<br><br>41<br>104 |
| | 8b | *Male' market is the main market for trading produce.* | 81 | 136 |
| | 8c | *Volatile market pricing.* | 58 | 85 |
| | 8d | *The role of transportation in connecting farmers to the market.* | 41 | 72 |
| | 8e | *Cooperatives as the new middlemen in trading produce.* | 36 | 65 |
| | | ***Total:**<br>* Any individual participant may have mentioned a theme more than once (or) on multiple occasions during the interview/focus group.* | **303** | **462** |

## Code introduction

The main Male' fruit and vegetable market, and to a lesser extent, the few regional markets that existed, were commonly viewed by participants as a constraint to farming viability in the Maldives. Reasoning for this view focussed on participant farmers inability to either sell their produce to the market, and/or not achieve the selling price they had anticipated. Underpinning this reasoning, the small size of the markets was noted as being prone to product shortages and surpluses, which allowed food traders to astutely manipulate product pricing, often at great speed. Participant farmers noted that rapid price fluctuations caused uncertainty in the business of farming, as projected crop selling prices became more difficult to gauge. A further reason that hindered participant farmers' connectivity to the

market was limited sea transportation, which often resulted in convoluted journeys for the delivery of produce from production islands to the Male' market. Participants further noted that most sea transportation was devoid of cool store facilities, which heightened the likelihood of product perishability during transportation.

In attempting to counter the impact of poor market linkages upon participant farmers, the establishment of cooperatives sought to collectivise farmers' output and provide markets with increased quantities and varieties of produce. Sourcing from a single island cooperative source was viewed by some participants as being more attractive to the market than sourcing produce through multiple individual farmers. The collective supply of farming inputs, and provision of services such as transportation to the markets was similarly envisaged through the new cooperatives. The reality of collective approaches to farming through cooperatives rarely translated into practice as most farmers continued to pursue an individualistic approach to farming activity.

**Subcode 8a:** ***Catchall phrase: 'Market is the main problem' for selling produce; Catchall phrase: 'Market is OK' for selling local produce.***

Eighty-seven participants in this research articulated two terms in their discussion on how markets worked for them in selling their produce (104 references). The two terms were: 'Market is the main problem', and 'Market is OK'. Both terms are now examined.

**'Market is the main problem':** Fifty-eight participants articulated the term 'market is the main problem'. This term related to a perception of the market's inability to absorb farmers produce, and to achieve a selling price that not only covered production costs, but also generated a profit (63 references). In a discussion with four participant farmers led by the president of an island council, the president succinctly equated poor markets to poor profitability when he noted: "Our profit is bad because the market is bad" (D#19). Echoing a similar sentiment, the spokeswomen of a group of six participant women farmers noted: "If the market is good, we can get more money, but it is bad" (D#2). As mentioned throughout this research, the generation of profit directly equated to participants' understanding of sustainability. Therefore, it was widely believed by participants that poor market connectivity hindered profit, and thus, agricultural sustainability.

An outlier comment from a participant farmer noted that markets did not always appear to work well for small island farmers but countered that this was in part due to the farmer's poor understanding of what the market required. As previously noted in this research, farmers were often producing food items that were either not required by the market, or

not required in the large quantities supplied to the market by the farmers (O#15). The participant farmer further contended that blaming poor markets for multiple farming challenges, irrespective of whether the challenges related to the market, had become a default position adopted by many farmers in the Maldives (O#15).

**'Market is OK':** The term 'market is OK' was articulated by twenty-nine participant farmers who noted that they were able to sell their produce easily either through farm gate sales on their islands, or through established trading relationships with neighbouring resorts and Male' based market traders (41 references). It was observed that many of these farmers understood precisely what the market wanted in terms of produce type, specification (weight, size, quality), pricing, and frequency of supply (O#101). Supply from farmers to resorts or traders was observed to be facilitated by regular communication between both parties, notably by mobile telephony, and predicated on a high level of trust both in honouring supply agreements by farmers, and in timely payments to farmers by traders (O#12).

A participant commercial farmer noted the ease with which his farming operation interacted with the market when he noted: "The marketing is quite easy really because we sell straight to the resort. We know what they want and when they want it. If we cannot supply, we tell them beforehand so they can prepare with another supplier" (I#130). In an interview with another participant commercial farmer, the high level of connectivity between the farm and the market was observed to be facilitated by a series of agents on neighbouring islands on which produce was sold, and by resort staff on resorts that were supplied with produce. The agents regularly communicated the produce requirements to the farm specifying produce type, quantity, and delivery schedules. As in the case of the previous participant, the farmer also notified customers in advance of anticipated delivery shortfalls allowing sufficient time for alternative supply arrangements to be made (O#119).

Adding to the commentary on the ease of market connectivity for some farmers, six participant farmers noted the strength in demand for local produce (8 references). A participant husband and wife farming couple noted: "There is no difficulty at all in selling our items [fruit and vegetables]. All the items are sold off very quickly. Whatever we grow we can sell. There is even too much demand for us" (I#57). This sentiment was validated in a discussion comprising eight participant students as one student neatly summed up: "Most of the farmers I know do not have a big farming business. They are small farmers with small lands growing a small amount of vegetables, so they don't need bigger markets. The market is OK

for the amount they grow" (D#11). This comment implied a commensurate fit between small farmers production capacity, and the demand for produce from local markets.

**Subcode 8b:** ***Male' market is the main market for trading produce.***

Eighty-one participants in this research acknowledged that Male', with its commercial food distribution businesses and fruit and vegetable market, was the main food trading hub for locally produced and imported fresh and frozen food (136 references). A participant commercial farmer noted the centrality of Male' as the distributive food hub for the country when he commented: "Most food for this country is coming through Male' at some time (I#111). The Male' market was further regarded by eighteen participant farmers as the market of last resort where produce that was unlikely to be sold in local island markets, was sent to Male' for sale (25 references). A participant husband and wife farming couple commented: "The main place for selling is Male', and sometimes the atoll market, but mainly the Male' market. They will usually take everything when other markets are full or there is no demand" (I#93). While there appeared some comfort amongst participants that produce could always be sold in the Male' market, three young farmers in a discussion noted that lower prices often accompanied selling in the Male market (D#21).

The Male' market was further regarded as preferable in terms of ease in conducting trading transactions both with locally produced food and imported food (23 participants, 29 references). A participant commercial farmer noted: "If we have surplus crops where our resort customers cannot take all the produce, we send it to Male' because it is easier than trying to sell the surplus to surrounding islands (I#130). And a participant general manager of a resort noted: "It's easier for us to buy imported food from Male' traders than it is to import the food directly ourselves. This is because the traders are geared up to clear customs, cold store, and distribute food, whereas, we are a resort not a food business" (I#138).

The centrality of Male' within the Maldivian archipelago further contributed to its popularity as a food trading hub for those resorts located within close proximity. Sixteen food trading participants noted that the close proximity of Male' to their resorts enabled daily collections of produce from the Male' market thus ensuring produce freshness (28 references). However, those resorts located further afield in the more southern and northern atolls either endured a lengthier food transportation process or sourced produce from smaller island or atoll markets (O#82). As noted by a participant chef of a guesthouse in a remote southern atoll: "I want fresh items for the kitchen so I try and buy from the market in this island. Getting from

Male' will mean the food is nearly a week old by the time it gets to this island, and often it may not be good" (I#82).

Despite the Male' fruit and vegetable market being viewed as a main part of the food trade nexus in the Maldives, eight participants in this research commented on its poor physical aspect and unsanitary state (11 references). Participants referred to the extreme heat endured by the market operatives, and the degrading effect this had upon produce. Rodent intrusion was further commented upon particularly in respect to irregular waste disposal of rotten produce (O#135). In spite of these conditions, there seemed to be a general view that the current facilities were better than those that had existed before 2015 where a concrete floor and new roofing were installed. Despite the improvements, a participant MoFA official noted that: "The fruit market still has the air of a makeshift facility; the farmers deserve better" (I#120).

**Regional markets:** Smaller regional markets were commented upon by seventeen participant farmers in terms of higher selling prices for farmers produce where transportation costs from the production island to a regional market were lower than those transportation costs to the Male' market (24 references). A participant commercial farmer noted:

> Because Kulhudhufushi Island is a regional centre and not far from us, we send 60% to 80% of our production to the Saturday market they have there. Many people go to that market on Saturday and buy food for the week. We also sell some food directly to resorts, and about 5% to 25% is sent to Male' on a weekly cargo vessel. It's easier for us to sell in the Kulhudhufushi market if we can, and the prices we get are better than Male' because the transport cost is lower (I#110).

Fourteen participant farmers further noted their preference in inter-island trading within atolls (18 references). A participant island council official commented: "We will sell our fruit and vegetables to one island, and buy fish, fish paste, and dried fish from the same island" (I#15). Despite the attraction of higher pricing associated with regional markets, seven participant farmers noted that there were only four to five regular regional markets operating in the Maldives that they were aware of. They continued that the regional markets had considerably smaller throughputs of produce than that of the Male' market, which often resulted in produce remaining unsold (10 references).

**Subcode 8c:** ***Low market pricing.***

Fifty-eight participant farmers in this research noted that low pricing from markets selling their produce resulted in their farming ventures being unprofitable, and by implication, unsustainable (85 references). Participants attributed the cause of low pricing mainly to the

market manipulation of agents controlling and trading both imported and locally produced food flows into the Male' market.

**Price setting agents:** Food traders. The food traders control of food imports has been already discussed in subcode 6b, *Food trader preference for imported food deters local production.* This discussion noted that food traders were able to import many items already grown in the Maldives at cheaper prices than those offered by local farmers. As the traders could control food import flows more easily than supply from local producers, so the traders could set the prices according to shortages and surpluses of stock in the market. As noted in a discussion by one of five Bangladeshi participant market traders: "We are here to make money not grow food. We set the prices for most food in and out of the Male' market and make good money" (D#24).

In terms of pricing for local production sold in the Male' market, thirty-one participant farmers in this research noted their concern over traders purchasing their produce at a low price, and then selling it at a much higher price in the Male' market (32 references). Participants noted that through mobile telephony and friendship networks in Male', they were able to identify the pricing attached to the sale of their produce in the Male' market; if very high sale prices were recorded, farmers often complained that they had been short changed by the trader (O#38). As summarised by a participant MoFA official:

> The problem is that if the trader pays the farmer, say, MVR46 [ 2.30]/kg for sweet melon and then sells it for MVR74 [ 3.70]/kg in the market, the farmer thinks he can sell it at the same price and keep all the money. Then the relationship between the trader and the farmer can break down (I#129).

The participant MoFA official noted that the farmers perception of high pricing was based on their estimations of the margin between the traders' costs and commission, and the final selling price in the market. The MoFA official contended that the traders were entitled to generate profitable margins, and farmers were not obliged to sell to traders. However, the official conceded that many farmers had little choice other than to sell to traders. In summarising trader activity, the another MoFA official noted:

> Traders make or break their own reputations with farmers depending on how they treat them. Traders are usually businessmen who have their own boats, or who can arrange boats to transport cargo to and from islands. They are not farmers. Many farmers are completely dependent on traders to get their crops to the market and get the best price. The trader sometimes organises farmers and tells them what to grow for the market. That way farmers and traders can work well together (I#125).

Countering the negative opinion of trader activity in the role of price setting of farmers produce, thirteen participants farmers noted the benefit of traders in connecting farmers to the market (15 references). The chairman of an island cooperative noted: "The farmers cannot usually find the buyers for their crops. It has to be a different person like a trader. He can do this better and get a good price (I#26). Further comment from a participant women farmer noted: "We have no problem selling to traders. They know how to sell for the best price to their market" (I#133). And a participant trader added: "We have established a good reputation with our farmers for a long time now. They know we will get a good price for them, and we always talk to each other to see how the crops are growing and when they will be ready" (I#11).

Boat captains. The issue of trust in trading produce proved of significance to eighteen participant farmers who noted that many farmers relied on friends, family or fellow islanders based in Male' to act as interlocutors in setting prices and transacting their produce in Male' (27 references). Where such friendship networks did not exist, participants noted their reliance on boat captains and their crews from the farmers own island. An observation from a large agricultural island indicated that the community knew its two boat captains well and trusted them not only to transport farmers produce to the Male' market, but also to conduct the sale transactions of the produce on behalf of the farmers (O#32). In an interview with one participant captain, he discussed the process of setting prices for the sale of farmers produce from his island:

> When we get to Male' at around 6am every morning, except Fridays, we hold an auction on board the boat for all the produce. Traders come and bid for it and pay spot cash. For every consignment being sold I have details including the weight, quantity, crop type, and name of the farmer. During the auction, I am often in phone contact with the farmer discussing the price. He trusts me to get the best price for him. Price is agreed and paid. I record all details and take the money back to the farmers on my island. For doing this work, I take a percentage of the sale for myself, which the farmers have agreed to. This works very well and has been going for a long time. The farmers and me all trust each other on my island (I#35).

Despite this display of trust placed in a boat captain and his crew, a participant farmer from another island sounded more cautionary in terms of boat crews as he recounted, that in the absence of a boat crew from his island or family and friends based in Male', farmers on his island had to rely on the services of a visiting boat crew: "We have no agent or island person to help us in the Male' market, so we rely on the boat crew that come to this island to collect the food items. They are not from this island but we have to trust them" (D#19).

**Price inflexibility:** Two outlier comments in this subcode offered a further insight into the issue of local pricing when one participant commercial farmer commented upon the price inflexibility of Maldivian farmers: "We Maldivians also have the attitude that we want to sell at the highest price, we will not drop the price usually" (I#121). A participant donor agency official elaborated on this trait when he recounted his experience of one lady farmer who chose to let her watermelons rot in the field rather than accept a slightly lower price than agreed with a trader (I#122). The official continued that the trader had reduced the price to accommodate a recent diesel price increase which had increased his transportation charges. The official concluded: "So she lost the whole watermelon crop value of MVR5,000 [ 250] for the sake of accepting MVR125 [ 6.25] less from the trader (I#122).

Contrary to price inflexibility, six participant traders and nine participant farmers struck a more resourceful note when they observed that price discounting was widely practiced in food markets in order to clear surplus stock (24 references). A participant shopkeeper and cooperative member noted: "I reduce the prices in my shop for the fruit and vegetables before the expiry time. It is better to sell at a lower price than throw away. I will give free of charge to my friends rather than throw the food away" (I#73). Agreeing the benefit of discounting food approaching expiry, a participant farmer cautioned whether all farmers would accept this: "The farmers feel that if they allow cheaper prices in the market, the customers will always want this and it will be disaster for them. But most will let it go cheaper just to get some money back" (I#47).

**Price fluctuations:** Thirty-two participant farmers in this research equated price fluctuations with lower prices being achieved for their produce (41 references), while fifteen participant farmers understood that price fluctuations could mean that prices rose and fell for their produce (17 references). It was unclear why fewer participant farmers chose to acknowledge the occurrence of price rises and falls in their understanding of price fluctuations.

Price fluctuations in imported food sold in the Male' market was alluded to subcode 6b, *Food trader preference for imported food deters local production,* and in the preceding section where the food traders control of imported food allowed for the price exploitation of produce shortages and surpluses. In terms of locally produced food sold in the Male' market, price fluctuations were framed within sudden market shortages and surpluses determined by oversupply, severe weather, and religious holidays (O#138).

Oversupply. Highlighting the rapidity of price falls, twelve out of eighteen participant farmers in three discussion groups on the same island, noted that a recent rapid fall in the market price for papaya had resulted in an immediate drop in the price traders paid farmers for papaya (D#19,20,21). One participant noted:

> The price dropped during the fourteen hour boat journey taking the papaya from our island to the Male' market. Before the journey started the trader agreed to give us MVR24 [ 1.20]/kg, and at the end of the journey he said the market price had dropped so he would only give us MVR14 [70p]/kg. (D#20).

The participants went on to note that when the produce reached the Male' market, the farmers had little choice other than to accept a lower than agreed price if they hoped to sell the produce. The reason for the rapid price fluctuation was attributed to a large and unexpected influx of papaya into the Male' market from another island (D#20). Nineteen participants believed that production surpluses were caused by a lack of coordination in production planning where many farmers duplicated the production of crops that traditionally generated high returns (30 references). As noted by a participant island council president: "Sometimes there is a shortage of bananas, and then everyone is producing bananas at the same time, so the market is full and the price reduces. It's the same with papaya as well" (I#29).

Weather affected production shortages. Thirty-four participants in this study believed that price fluctuations were attributable to poor weather conditions that affected the quantity and quality of crops supplied to the market. The participants further believed that bad weather reduced the frequency of ferry transportation between production islands and the Male' market resulting in less local produce entering the Male' market (27 references). As noted by two participant cooperative members, rough seas sometimes bruised the fruit making it unfit for sale in the market:

> Last June/July we lost 1000 kg of cucumber as we could not get them to the market because of the rough seas. All the boats were stopped for fifteen days. This happened to a lot of farmers in our atoll. So, the cucumbers just rotted away because we could not send them. Then there were few cucumbers for the market. This makes the price go up if they don't get from outside [imports] (I#14).

In commenting upon interrupted supplies of local produce being replaced by imports, a participant MoFA official noted that the heightened frequency of bad weather had resulted in many traders securing uninterrupted deliveries of air freighted imported fresh produce. The official noted that whilst local farmers lost out in supplying local produce to the market, food imports prevented shortages and stabilised market pricing (I#120).

Ramadan. Twenty participants cited the holy month of Ramadan as being the time when the greatest price increases for fresh fruit occurred, particularly watermelon for juicing during the breakfast (29 references). It was observed that although price increases were anticipated due to the high traditional demand during Ramadan, demand nearly always outstripped supply resulting in rising prices (O#24). A participant commercial farmer commented: "During Ramadan the price of watermelons will go to MVR50 [ 2.50]/kg, but after Ramadan the price will drop to between MVR4-10 [20p–50p]/kg because there are too many watermelons in the market" (I#126).

Similarly, a participant husband and wife farming team famous on their island for their prolific chilli production noted that during Ramadan the price for a kilo of chillies could reach MVR290 ( 14.50)/kg, whereas it would be around MVR31 ( 1.55)/kg at other times of the year (I#94).

**Price stabilisation:** A MoFA official contended that small markets were invariably price sensitive where product shortages and surpluses acted quickly in affecting pricing (I#120). In mitigating price fluctuation in the Male' market, the official contended that maintaining food flows from local producers and food importers was a priority. Another MoFA official observed that increased price stabilisation could be achieved by increasing the productive capacity of farmers in order to provide more food to the market. The official added that this need not be at the expense of food imports which were regarded as vital in securing national food security (I#125).

In examining price stabilisation and it supporting mechanisms, a participant official from the State Trading Organisation (STO) argued that price stabilisation was not simply dependant on the increased productivity of local farmers, but further required mechanisms to better connect the farmers produce to markets (I#114). The official noted that STO had attempted to implement such a mechanism in 2011[44] to absorb product surpluses from a regional market in the north of the country in order to sell in STO retail outlets in Male' (I#114). The manager of this venture noted that prices paid to farmers were below that of the market rate but were guaranteed in conjunction with a commitment to purchase predetermined quantities and not just surpluses (I#114). The participant STO official noted that the venture ceased operation in 2013, as farmers were reluctant to supply the STO on a regular basis, particularly if they could achieve higher selling prices for their produce elsewhere (I#114).

[44] A company called Isle Fresh was established to accommodate the purchase of excess produce from farmers.

Commenting on the STO venture, four participant farmers noted that while it was a good idea, they wanted to use it more as a stop gap to absorb periodic excess produce rather than a regular sales channel (D#3).

**Payment terms:** Three differing payment terms for transacting farmers produce were observed in this research (O#137). The first payment term involved 'spot cash' payments to farmers where traders purchased the farmers produce outright. The second payment term involved the farmer and trader agreeing a fixed market selling price for the farmers produce. If the trader exceeded the selling price, he retained the extra profit, if the sale price was lower, the trader carried the loss. In this type of agreement, the farmer only received payment for the produce once the trader has sold it. The third payment term relied on the trader obtaining the best market price for the farmers produce, with a commission paid to the trader on the sale of the produce (O#137).

Issues in trusting traders to pay fair prices to farmers in a timely manner have already been discussed in this subcode. However, in this section, it was the participant traders who levelled the majority of complaints concerning payment terms. Ten out of fourteen participant food traders noted cash flow difficulties in purchasing produce from farmers for spot cash, and then supplying to resorts who insisted on sixty to 120 days credit. One participant trader noted: "We need to have a good cash flow to carry the balance between the time of buying from farmers and getting money from customers" (I#11). A less accommodating view of credit demands by resorts came from a participant commercial farmer: "The credit we have to give resorts is too much and we cannot fund our bills. There are traders that have gone out of business because of this" (I#126). The participant added that local suppliers had stopped supplying resorts who insisted on large credit terms and added: "Now if they want to buy produce, they have to import directly and pay upfront in dollars. Outside food suppliers will never give any credit to local customers" (I#126).

Resorts responded to claims by participant food traders that delayed payments were causing hardship noting that they generally tried to accommodate local suppliers with cash payments. However, their own cash flows often necessitated the need to adopt a creditor schedule up to three months before settlement. Many of the resorts interviewed in this study further noted that lengthy credit terms were often available with international food suppliers based outside the Maldives (O#137).

**Subcode 8d:** ***The role of transportation in connecting farmers to the market.***

Transportation challenges would not be expected to be uncommon in such a geographically dispersed nation as the Maldives. Indeed, issues of limitations in transportation between islands and the main Male' hub has featured in two previous subcodes: *6e High transportation costs associated with food imports should stimulate local production where lower transportation costs are achievable;* and*, 7d, Limited access to farming inputs including: equipment; pesticides; seeds; and fertilizers.* And so, the same modes of transportation with their attendant restrictions of infrequent scheduling and sparse island coverage equally applied to the distribution of farmers produce as they did farming inputs. As summarised by a participant manager of a handicraft centre: "Everything is down to transportation in the Maldives. Everybody's issue is transportation. If it doesn't work properly, nor do we" (I#123).

**High cost, infrequent service, and limited island coverage:** In this subcode, forty-one participants reflected that transportation was as a major consideration in connecting farmers to the market (72 references). Twenty-seven participants noted that although government ferries were an affordable method of transporting small/medium sized quantities of produce to the market, their routing bypassed many islands, and their schedules could be erratic for those islands they did serve (48 references). Twenty-one participants elaborated on the bypassing of islands and noted that cargo often had to be transhipped via Male' in order to reach a customer island that was close to the production island (29 references). In commenting on this type of transportation dislocation, a participant trader noted: "It makes a huge difference if islanders cannot trade with each other when their islands are so close by. All the time you have to go through another island which costs more money" (I#107).

Complementing government ferries were private passenger and cargo ferries that followed similar sailing schedules and island coverage, but mainly charged higher transportation fees than government ferries (O#90). As noted by a participant boat captain for a private cargo vessel: "We used to let islanders transport their vegetables and fruit free of charge if there was space. But now everybody is sending cargo between the islands, so there is no free space and we charge everyone the same rate" (I#35). In a discussion on a large inhabited island, all four participant farmers blamed high transportation costs of private ferries as the main reason for the demise of farming on their island. One participant noted: "The Male' market is more than a day's sailing away, so it is too expensive to send produce on the

private cargo boat, and there is no government ferry. So, most farmers have given up on the farming on this island" (D#3). An outlier comment from a discussion with six young participant farmers repeated an earlier comment made in connection to the supply of farming inputs to islands close to Male'. The participants noted that the high frequency and low cost of private ferries between these islands and Male' enabled good connections to the market (D#21).

Nine participant farmers echoed the sentiment that islands close to main transportation hubs, or in close proximity to Male' were served by more regular ferry services charging affordable cargo rates (13 references). In the case of larger inhabited islands, participants noted almost daily government and private ferries traversed the route to Male'. In commenting upon the regularity of ferry transportation to Male', a participant husband and wife farming couple noted: "I can send my chillies to the Male' market on two boats from this island. The boats go twice a week. It's a good service" (I#93). An outlier comment from a participant farmer noted her unusual transportation arrangement with a neighbouring resort where the resort cargo dhoni picked up her produce on its way to Male' free of charge and delivered to her family for sale in the Male' market (I#133).

**Product perishability:** Fifteen participant farmers cited long sea journeys as causing spoilage to produce mainly due to an absence of cool store facilities on most government and private ferries (17 participants). While farmers were careful to pack produce in banana leaves and Styrofoam boxes, and boat crews were mindful of storing the produce away from direct sunlight, the length of the journeys, often in excess of twelve hours, and in sometimes rough seas, invariably led to some damage of produce (O#133). As noted by a participant commercial farmer: "Sometimes the boats will travel at night, which is cooler, but the journey can still take as long as 24 hours without any cold storage. This means the salad leaves are sometimes spoiled when they get to Male'" (I#97).

**Airfreight:** Air transportation of locally produced food was not widely commented upon by participants in this study largely because it was rarely used to transport produce from production islands to the Male' market (O#103). Most participants noted that the cost of air transportation was too high, and the availability of cargo space was limited in being dependent upon passenger luggage (O#103). However, a participant atoll council official was positive regarding the potential of air freighting produce from his island to Male' in the future: "Now we have an airport on our island, we can construct cold stores at the airport so we can send food items regularly by airfreight to Male" (I#65). A differing interpretation of

increased air traffic came from one participant farmer on the same island. He noted that more flights to the island had reduced the frequency of passenger ferries to the island. He added that as passenger ferries traditionally carried much of the agricultural produce to and from the island, the island had become more disconnected in the trade of agricultural produce (D#8).

Airfreight transportation was extensively used for the importation of food as mentioned in the subcode 6e, *High transportation costs associated with food imports should stimulate local production where lower transportation costs are achievable*. Whilst airfreight typically was used in the importation of perishable stock such as salads and fruit, less perishable stock such as cabbages, potatoes and carrots were often sea freighted from neighbouring South India and Sri Lanka (I#103).

**Subcode 8e: *Cooperatives as the new middlemen in trading produce.***

Commentary on the presence of cooperatives in Maldivian agricultural life was common within the issues raised by participants in this research, particularly in subcode 4b, *Formalised collective farming activity through such entities as cooperatives does not fit easily within island communities.* However, in this subcode thirty-six participants commented on their belief that cooperatives were the new middlemen in trading produce (65 participants). Supporting this position in a discussion with six participant farmers, one farmer summarised: "The farmers produce the items, and the cooperative buys the items and sells them to resorts. The cooperative now stands as the middleman" (D#2).

Twenty-eight participants in this research posited that cooperatives were better able to marketing farmers' produce to resorts than individual farmers (38 references). This position was based on two main beliefs held by participant farmers: (i) one collective body representing smaller farmers would be easier for resorts to trade with than a selection of smaller farmers; and, (ii) a legally constituted cooperative would be regarded as more trustworthy by resorts than individual farmers who largely operated on an informal basis. Commenting on the first point, one participant farmer noted: "With cooperatives it will be easy to sell to resorts because it's just one cooperative, and not a lot of different farmers trying to do a deal with the same resort" (I#56). In terms of the second point, a participant commercial farmer noted:

> The resorts will need some kind of confidence and commitment that they are going to get supplies locally. They are more likely to buy locally from a cooperative than an individual

> farmer because it is registered with the Ministry and legal…farmers by themselves are not registered legally (I#97).

And a participant commercial farmer added: "It's because we don't trust each other you know, it is better to let the cooperatives be the middleman for farmers in selling items to resorts. That way we should all be able to see what deal is going on" (I#109).

**Cooperative communication:** Integral to the middleman status of cooperatives was their ability to communicate effectively between farmers supplying produce and customers buying produce. A participant farmer noted: "The cooperatives should be supplying what the resorts want when they want it. They need to establish a close relationship with each other to do this" (I#71). A past participant cooperative chairman noted that where there was not a good level of communication, misunderstandings occurred which could result in the customer severing ties with the cooperative (I#73). Two participant cooperative member farmers noted such an example when their cooperative had its order for eating eggs cancelled by a neighbouring resort: "We could not supply the full 1,500 eggs per week to the resort because farmers did not give us enough eggs. We did not tell the resort in time and they got angry with us and cancelled the order and bought eggs from outside" (I#18).

**Cutting out the middleman cooperative:** Thirteen participant farmers noted that they preferred supplying their produce directly to neighbouring resorts as they would secure higher sale prices, and more regularised orders (18 references). In a discussion with a women's development committee, one participant farmer noted: "If resorts are nearby and we are close to their staff, we can do good business together." (D#27). Removing the cooperative as the middleman in the trading transaction was further noted in a discussion with six young participant farmers, when one farmer commented: "If the resort is near, we can hire a boat and take the items straight to them from our site with no middlemen or co-op in the deal. We will get the best price this way" (D#21).

The merits of direct sales from farmers to customers where regularised orders in terms of quantities, quality, pricing and delivery schedule, were logical according to a participant MoFA official (I#125). However, as acknowledged by a participant commercial farmer: "It is difficult enough for our company to supply the resorts directly with the quantities they need, never mind for a small farmer. Even if we say we can supply, we cannot always, and then the resorts go away from us and get some other supplier" (I#97). Two participant farmers echoed similar sentiment when they noted that resorts wanted greater quantities and varieties of produce than could be produced by one farmer. They noted that pooling

farmers crops together may be a good idea, but not through the vehicle of a cooperative (I#14).

## Code summary

Box 8 presents the key points to emerge from Code 8, *Farmers have difficulty in connecting with the market in order to sell their produce.*

**Box 8. Key points from Code 8**

- **Poor markets.** More participant farmers in the research viewed markets in a negative light through the phrase "Market is the main problem", than in a positive light through the phrase "Market is OK".
- **Male' market was the main trading hub for food.** The Male' market was acknowledged by participants as the main trading hub for locally produced and imported food. It was also regarded as having the capacity to absorb excess produce albeit at lower prices. Regional markets could realise higher prices for farmers but were unreliable in absorbing all farmers' produce.
- **Low pricing of produce.** Market interlocutors acting on behalf of farmers negotiated the sale price of farmers produce sold in the market. Interlocutors included: family and friends; fellow islanders based in Male'; food traders; and, boat captains**.** Factors affecting price setting included surpluses and shortages of local and imported food, and variables affecting local production such as severe weather. The rapidity of price fluctuations was noted as a function of small markets. Price stabilisation was dependant on adequate food flows (both local and imported) being maintained. Farmers/traders were faced with extended credit demands by resort customers, which had a detrimental effect upon their ability to continue supplying produce.
- **Limited transportation coverage.** Participants noted that the national sea transportation network comprised government and private ferries linking islands with both atoll hubs and to Male'. Ferry services were mainly deemed infrequent for outer islands with private ferries charging more for cargo. Islands within close proximity to Male' experienced frequent service and competitive cargo rates. Ferries did not typically include cool store facilities, hence there was produce spoilage. Airfreight was common for food imports but uncommon for local production due to cost and lack of cargo space.
- **Cooperatives as the new middlemen in trading food produce.** Participants noted the attraction to resorts of a collective cooperative trading platform where one entity, rather than many farmers, could trade produce. However, some farmers still preferred to deal directly with resort customers. MoFA noted that it was problematic for any local food production source to satisfy resort food requirements due to the large quantities and varieties that were required.

**Code 9** **People believe fresh fruit and vegetables contribute to good health, but they are often omitted from diets.**

**Table 13. Code 9**

***People believe fresh fruit and vegetables contribute to good health, but they are often omitted from diets.***

| **Code: 9** | **Subcode: 9a, 9b, 9c.** | | **No. of participants.** | **No. of references.** |
|---|---|---|---|---|
| ***People believe fresh fruit and vegetables contribute to good health, but they are often omitted from diet.*** | 9a | *Awareness that fresh food contributes towards good health.* | 55 | 80 |
| | 9b | *Fresh food is not always accessible, and not always preferred.* | 38 | 52 |
| | 9c | *Preference for processed food* | 25 | 31 |
| | | ***Total:** * Any individual participant may have mentioned a theme more than once (or) on multiple occasions during the interview/focus group.* | **118** | **163** |

## Code introduction

Code 9 comprised three subcodes where participants commented upon their belief that locally produced fresh fruit and vegetables contributed to good health. Despite this belief, participants noted that there was still a strong preference for inexpensive processed food imports largely driven by the taste preference of the youth. In this code, scant reference was made to the link between the desire for fresh food acting as a stimulus in building sustainable agricultural capacity. However, participants did note that there was a strong preference amongst the tourist sector for fresh food which could drive local production.

**Subcode 10a:** ***Awareness that fresh food contributes towards good health.***

**Defining freshness:** Fifty-five participants in this study acknowledged locally produced food that could reach the market place within twenty-four hours of harvesting would be defined as 'fresh' food, and, therefore, good for health (80 references). In this research, locally produced food was commonly referred to as fruit, vegetables, salad items (leaves, tomatoes and so forth), and spices. Since most locally produced food was not processed, but sold as whole units as harvested, the delivery time of twenty-four hours from farm to shop was usually achievable (O#138).

Participant market sellers were aware of the need to present food as being fresh to customers and were regularly seen spraying food with water droplets to give a freshly

picked appearance (O#138). In a discussion with six participant Bangladeshi fruit and vegetable sellers in the local market, one summed up the significance of a fresh visual impact for food when he noted: "Many times the customers will ask if the food is fresh, and which island it is from. Some islands have a good reputation for fresh food, so the customers are happy to buy food grown there." (D#24).

Twenty-eight participant customers in this research noted their preference for fresh food produced in the Maldives rather than fresh food imports (32 references). This preference was predicated on the perception that there was a longer time timespan between harvesting and point of sale with food imports, which could diminish freshness. Commenting on this perception, one participant Bangladeshi food trader noted: "The customers know that imported food will pass through many hands before it gets to our market. They think it loses some of its taste during the travel and is not as good as being pulled from the Maldivian earth" (D#24). The preference for farm gate sales where food was freshly picked was noted by a group of six participant students when one noted: "Because it is from the farm on the other side of the island, we know it is very fresh. We can even go and pick it ourselves if we ask the farmer" (D#7). Summing up the positive attitude towards fresh local production, a participant farmer in a discussion with seven other farmers noted: "People have confidence if we are producing fresh food with our own hand. This makes us happy and satisfied" (D#1). A participant MoFA official added: "People believe eating fresh produce will lead to a long life, keep diseases away, and help cure medical conditions" (I#129).

**Food safety and human health:** An outlier comment from a participant food trader in this research noted that consumers were increasingly suspicious of food that looked too perfect in the market, believing it to be chemically enhanced and, therefore, detrimental to health (I#11). This comment illustrated the wider concern of participants over public health being negatively impacted by chemically enhanced food, where high levels of residual chemicals may cause food poisoning (43 participants, 51 references) (O#153).

In the event of chemical contamination of food, participants believed that local food sources would be easier to monitor in terms of traceability than unknown traders supplying imported food. Commenting on local food trustworthiness, one participant farmer asserted: "Food produced by Maldivians will be more trustworthy. We know where it is from and who to contact if there is a problem" (I#21). Countering this assertion, nine out of fourteen participant food traders noted there would be little idea of where contaminated food came from within local production sources as record keeping amongst local farmers was poor.

One of the food traders added: “We can trace a lot of the food we bring in from suppliers in Dubai and Thailand. Traceability is part of their customer guarantee service” (I#8).

From the data collected, there was no evidence that food poisoning from either locally produced or imported food had taken place in the Maldives. However, the press periodically raised concerns over products imported into the Maldives that had caused problems in other countries (O#153). An example of this was noted in a local press report in December 2016 where Hepatitis A had been detected in frozen strawberries from Egypt that were being sold in the USA. The Maldivian Food and Drug Authority confirmed that the batches of imported frozen strawberries currently being sold in the Maldives from Egypt did not pose a threat to public health (O#153).

**Nutritional awareness:** The message of fresh food contributing to good health was conveyed to schoolchildren and parents through nutrition awareness programmes in schools, and to the wider public through public health messaging, and medical practitioners (O#139). The messaging conveyed the importance of a balanced nutritional diet and offered advice on how to achieve this (O#139). As noted by the participant principal of an atoll school:

> We teach kids and parents to mix the diet, so one day it is chicken, and then fish the next day, but always with some green vegetables and leafy salads. They should also have some fresh fruit like bananas and papaya. Coconut water straight from the nut is also very good for health (I#77).

Of the twenty-six youth participants in this research, all acknowledged that they were aware of the benefits of a nutritionally balanced diet, noting that good skin condition, physical strength and growth, and good digestion, were symptomatic of a balanced diet (26 references). A participant public health officer added that parents of young children under two and five years old, and pregnant women, were also targeted with information relating to dietary nutrition in public health programmes (I#60).

Nutritional awareness was also undertaken by eight out of the nineteen resorts visited (O#139). Awareness campaigns typically targeted resort staff, and the communities on neighbouring islands where cooking demonstrations using less oil/sugar/salt in the preparation of traditional foods were demonstrated. A participant executive chef noted: “Islanders liked to see new and affordable ways of making their food healthier and sometimes tastier” (I#79).

**Symptoms of poor nutrition:** Twenty participant medical practitioners cited constipation and haemorrhoids as the main complaint of islanders caused by a lack of dietary fibre (27

references). They further noted that these conditions were due to the reluctance of many islanders to include green vegetables in traditional rice and curry dishes. A participant doctor commented: "We tell them to cut down on fried and starchy foods, and junk food as well. Only some of them listen. Most will return to this clinic with the same problem" (I#27). One participant doctor added that the double burden of under nutrition and obesity, particularly in relatively young people aged fifteen to eighteen years of age, was of national concern. He continued, that high cholesterol levels from nutrient deficient processed foods, and anaemia in women, were further cause for concern (I#51). In terms of addressing poor diets, a participant public health officer noted: "They are beginning to listen and change the diets, but it will take more time before most of the people do" (I#60).

**Subcode 10b*: Fresh food is not always accessible.***

Analysis of this subcode revealed that thirty-eight participants believed fresh food was not easily accessible due to high pricing and or lack of availability (52 references).

**Food affordability:** Thirty-one participant farmers noted that they were net food producers rather than buyers of their own produce. This was attributed to the high returns that could be achieved from sales of produce to resorts, which in turn funded purchases of cheaper food for the farmers own consumption (38 references). This point was illustrated in commentary from a participant farmer/teacher when he noted:

> If farmers sell bananas, papaya, sweet melons to resorts or the Male' market, they can earn good money to buy cheaper food like rice, noodles, biscuits and fish. They cannot afford to buy sweet melons, and because they are not in our diet, we don't miss eating them. The problem is that farmers are selling good healthy food so they have enough money to buy cheap processed food, which is not good for health (I#42).

An example of price differential between selling locally produced bananas to resorts and buying rice for the family was quoted by two health practitioners: "Farmers can sell a bunch of 200 banana's for MVR250 [ 12.50], and with that buy rice costing MVR225 [ 11.20] to feed a family of four for a month[45]" (I#22). A participant school headmistress summed up this interpretation of food affordability when she relayed a common saying in the Maldives: "People will sell a fish to buy a coke and a packet of noodles" (I#113).

The impact of food subsidies on food affordability was not widely commented upon in this research other than passing reference to 2016 when the GoM attempted to reduce the subsidy on the staples of rice, wheat flour, and sugar. This action created a public backlash,

[45] Average rice consumption for a family of four estimated at 28 KGS per month at a cost of MVR225 (£11.20)

and the cut in the subsidy was reduced to lessen the burden upon lower income families (O#126).

**Food availability:** Most participants in this research noted that food was readily available in the Maldives, with GoM providing subsidised staples, and local fishermen and farmers providing fish, coconut, and a variety of other fruit and vegetables. Despite the general food availability, eighteen participants noted that islands that were wealthier, and generally closer to Male', had greater varieties of produce available, particularly if tourist guesthouses were situated on the island (24 references). Seventeen participants further contended that changing dietary habits linked to a greater awareness over the health benefits of fresh food, had also increased the variety and quantities of food on islands (20 references). As explained by one of three young participant farmers:

> Up to five or six years ago there was little fresh fruit and vegetables on this island to buy, but now most of the small shops have them. People realise this type of food is good for the diet now, so they are buying more of it. As soon as the shopkeepers realise that people want different food, they will act quickly because it is good business for them (I#56).

This research observed that virtually any quantity or type of food was available in the Maldives as it could be drawn from the significant inflows of imported food serving the tourist sector (O#17). Food accessibility was then more determined by affordability than availability which supported the previous contention that Maldivian food security was determined more by the capacity to purchase food than produce it (O#17).

**Subcode 10c: *Preference for processed food.***

Twenty-five participants noted that the Maldives followed global trends in processed food consumption, particularly amongst adolescents and young adults where preferences for foods containing excess sugar, fat, and salt, were commonplace (31 references). The participants further noted that there was very limited food processing in the Maldives other than tuna products for export, and livelihood activity involving coconut oil, chilli paste, taro chips and fruit juicing (O#17).

**Convenience:** In a discussion with ten participant farmers, they noted the availability and affordability of processed foods in island shops stating that processed foods occupied considerably more shelf space than that of fresh produce (D#8). The participants observed that processed foods included: tinned cheese, powdered milk, fizzy/energy drinks, sweet biscuits, noodles, frozen chicken, canned fruit, canned vegetables, and so forth (D#8). When queried about the inclusion of canned fruit and vegetables in diets rather than the fresh

locally produced equivalents, it was explained that canned food had a lengthier expiry and was not required to be stored in refrigerated conditions. In a discussion with four participant cooperative members, one member/farmer noted: "My friends say it is easy with cans. No cool storing, peeling, or chopping. Just boil, add sauce, and eat. It's convenient" (D#16). A participant farmer reinforced this view when she noted: "It is easier to prepare fish fingers than gut and fillet a fish, and our kids like the fish finger taste because it is fried. It is cheap and available which is why we eat a lot of it (I#21).

**Variety in the fish and rice diet:** During the fieldwork, I observed that most of the island restaurants served very little local fish curry and rice, but instead served noodles, fried chicken, and an assortment of very sweet cakes made with imported cake mix (O#100). After talking with four participant restaurateurs about this situation, the reason for the absence of local produce on the menus became clearer as one restaurateur noted that his clientele mainly comprised of youth who preferred a change from the fish and rice diets served in their homes. He further noted that pizza, burgers, noodles, and fried chicken were all popular because their taste was preferred over that of traditional home diets (I#37).

**Food taste:** Twenty-three participants in this research contended that the main preference for processed food was predicated on taste (28 references). A participant Pakistani doctor agreed when he noted that as vegetables on his island had a 'watery' taste, processed food offered a tasty alternative (I#91). A participant environmental club student added: "Everybody knows vegetables don't taste that nice, so people would rather stick to fried foods. It is tastier to fry vegetables. We like oily, fried food, and very sweet things in the Maldives" (I#64). Twenty-six participant farmers who were parents added their voice to the taste issue when they noted that their children largely determined the type of food that was prepared for meals (31 references). A participant school headmaster confirmed this fact when he noted: "The parents want their kids to be happy so they feed them want they want, which is often junk food" (I#41). A participant agro dealer summed up the taste issue when he noted: "It's simple, people want taste from food more than they want health from food. They will not eat healthy food if it is not tasty" (I#107).

**Changing diet:** Despite the data indicating a preference for processed food in this research, fifteen participants noted that diets were changing to include more fresh fruit and vegetables (22 references). Adding to this momentum, two outlier comments noted that there was something of a revival in traditional preparations of foods where fried rice was being replaced with boiled and spiced taro as a starch substitute (I#107). The increasing use of

coconut water as a cool drink was further mentioned as a healthier option to caffeine and sugar laden soft drinks[I#113].

Greater awareness of the health benefits of fresh produce was mainly attributed to the change in diets with one participant farmer noting: "We did not know what it was like to eat vegetables in our food or how to put them into our food until a few years ago" [I#74]. A participant shopkeeper/farmer added that greater access to food had increased the variety of fruit and vegetables that his customers were interested in experimenting with in their diets [I#73].

## Code summary

Box 9 presents the key points to emerge from the Code 9, *People believe fresh fruit and vegetables contribute to good health, but they are often omitted from the diet.*

**Box 9. Key points from code 9**

- **The preference for fresh Maldivian produce:** Participants noted their preference for locally grown fresh produce rather than the imported equivalent, mainly due to the belief that it was fresher having been grown locally and could be traced more easily in the event of food poisoning.
- **Nutritional awareness did not always translate into healthy diets:** Participants knew about the nutritional benefits of fresh fruit and vegetables, particularly in addressing ailments caused by poor nutrition. However, participant health practitioners noted that patients did not always follow recommended diets for correcting ailments.
- **Food accessibility was determined by food availability and affordability:** Participant farmers noted they were net food sellers as they grew food for sale rather than consumption. From the sales of exotic fruit, participants noted they could purchase flour, rice, and sugar, which would sustain them for long periods. The proliferation of tourism had increased the variety and quantity of available food. Food availability was more determined by the capacity to buy food, rather the capacity to grow food locally.
- **Preference for imported processed food:** Participants noted that imported processed food was inexpensive, readily available, had a long shelf life, was convenient to store and prepare, and was tasty, particularly to the youth. Youth participants further noted that it provided a welcome change to the staple fish and rice curry diet. Diets were noted to be changing to include more fresh vegetables, however, the desire for processed food appeared undiminished.

## 5.3. Chapter summary

Participants in this research noted their main motivation for farming was the generation of profit. In some instances, the notion of profitability appeared to be unencumbered by accurate record keeping. However, in most instances profitability was intimately associated with trustworthiness where farmers noted that farming within family units or with close friends was more likely to be profitable as such farming partners could be trusted.

Agricultural labouring was acknowledged by participants as being primarily undertaken by male migrant labour from Bangladesh, and to some lesser extent Maldivian women. In the case of larger farming units that aspired to agribusinesses, Maldivian men managed such units utilising migrant labour. Within the agricultural workforce, participants noted the absence of youth. Youth viewed agriculture as a low paid activity undertaken by migrant labour, and as a pastime undertaken by the elderly. This stigmatisation was reinforced by community and parental perceptions where fishing was generally held in higher regard than agriculture as an occupation, and parents were reluctant to see their children's education being squandered on manual labouring in fields. In correcting this perception, participant teachers argued that the teaching of agriculture that embraced commercial rationale would assist in destigmatising its low-class status in favour of one that embraced enhanced productive output utilising technology. This, they contended, would result in greater profitability and would incentivise youth into farming.

Production challenges cited by participants included knowledge gaps in best practice farming particularly in relation to the use of pesticides and fertilisers, and limited accessibility to technology, farming inputs, land, and funding. Such challenges hindered the continuous supply of produce to the market. Local pricing and produce quality were similarly challenged by food imports which many participant traders and resort operators regarded as the mainstay in supplying the national food requirement. Within the discussion on food imports, the majority of participant farmers believed that reducing food imports would act as a stimulus for local production. However, participant MoFA officials, food traders, and resort operators were sceptical of this view, noting that limited local productive capacity and a lack of commercial thinking within island agriculture could not, at this stage, replace commercial food supply from external sources.

Participants noted the health benefits of eating fresh food and vegetables but acknowledged that they were not always present in the diet. This was ascribed to a preference for 'tastier' processed food by the youth, and the sale of local fresh produce to resorts where favourable selling prices could be achieved. Despite the commentary on the importance of fresh food for good health, there appeared less emphasis placed upon this consideration in encouraging farming, than the emphasis placed upon increased productive capacity for the generation of profit.

# Chapter 6. Findings (3). Measures farmers in the Maldives believe will help build agricultural capacity through sustainable means.

## 6.1. Chapter introduction

Chapter 6 presents the data collected from participants in this research relating to the third supporting question:

- *What measures do farmers in the Maldives believe will help build agricultural capacity through sustainable means?*

Analysis of the data saw the emergence of the code 10, which discussed the participants' understanding of institutional assistance for agriculture provided mainly by MoFA, and what measures could be taken to improve such assistance.

Data contributing to this code was mainly elicited from the last question raised during the interviews and discussions:

- *Q12. If you wanted to change the way you are farming now, how would you want to change, and how would the change improve your farming?*

## 6.2. Coded data

**Code 10 Institutional assistance for agriculture needs to be re-orientated in favour of farmers' needs.**

**Table 14. Code 10.**

***Institutional assistance for agriculture needs to be re-orientated in favour of farmers' needs.***

| **Code: 10.** | **Subcode: 10a, 10b, 10c, 10d.** | | **No. of participants.** | **No. of references.** |
|---|---|---|---|---|
| ***Institutional assistance for agriculture needs to be re-orientated in favour of farmers' needs.*** | 10a | *MoFA and other actors attempted to fill the agricultural knowledge gaps that constrain farming.* | 78 | 95 |
| | 10b | *Incentives for agriculture including: subsidies; regulation; land tenure reform; simplification of bureaucracy; private sector participation.* | 71 | 105 |
| | 10c | *The assistance given to farmers had mixed results (unsustainable project interventions, dependency and entitlement resulting from MoFA assistance, unsuitable cooperative models, corporate social responsibility programmes).* | 61 | 81 |
| | 10d | *Improved accessibility to farming technology and infrastructure.* | 31 | 37 |
| | | ***Total:** | **241** | **318** |

| | | | | |
|---|---|---|---|---|
| | | ** Any individual participant may have mentioned a theme more than once (or) on multiple occasions during the interview/focus group.* | | |

## Code introduction

In this code, there was considerable momentum within participants commentary supporting the recalibration of institutional assistance from MoFA and its donor partners towards farmers. Participants noted that as many of the institutional interventions were donor driven, they tended to favour wider development targets addressing the socioeconomic improvement of vulnerable groupings, rather than immediate challenges faced by farmers. Whilst the generic blueprint of donor assistance was in some measure shaped to fit the country context in which it was being implemented, the sufficiency of the fit in the Maldives was lacking resulting in disinterest from farmers towards participation, and frustration from MoFA in project implementation and management. In addressing such institutional deficiencies, participants recommended MoFA re-orientate its assistance to address specific needs encountered by farmers. Participants suggested that such a process should include improved access to agricultural knowledge and technology, new regulatory support, and incentives to invest in farming including the reform of farmland tenure on inhabited islands.

### Subcode 10a: *MoFA and other actors attempt to fill the agricultural knowledge gaps that constrain farming.*

Knowledge gaps in agriculture were widely noted throughout this research as participants commented upon the nature of the gaps and ways in which they could be filled by MoFA, farming friendship networks, and self-help (78 participants, 95 references).

**MoFA:** In this subcode seventy-eight participants revealed their concern that the knowledge gaps in farming were of sufficient magnitude to confine its operation to a subsistence and semi-subsistence activity (95 participants). However, it was unclear whether participants felt that increased agricultural knowledge would be sufficient to close the gaps and propel subsistence farming into the commercial arena. Participants further noted that while MoFA was the main source of agricultural assistance to farmers in the Maldives, its attempts to fill the knowledge gaps in farming was in itself confined by capacity deficits in technical knowledge amongst its extension services, and poor national coverage due to budgetary constraints (O#107). As noted by one participant commercial farmer: “It is obvious that many farmers want to grow more, but problems like pests stop them like a full stop. MoFA can’t

really help because they either don't know the answer or cannot visit the island to see the problem first hand" (I#124). Two participant women farmers added their voice when one noted: "We don't understand a lot of farming things. We need help from MoFA and outside experts. They have to come here and be with us for the growing to show us the best ways, and the new ways" (I#74). And a further comment came from a participant farmer discussing his inability to match product specifications required by his customers: "The resorts I supply want melons at 3 KGS not below. I cannot get all my melons to this weight, so sometimes I have up to 25% wastage. MoFA need to give me some knowledge to get 3 KGS" (I#50).

In response to calls from participant farmers to provide more knowledge, a participant MoFA official conceded that technical knowledge within the Ministry's extension services was inadequate largely due to a lack of funding for training in speciality areas such as integrated pest management and plant disease prevention (I#10). The official further commented that bringing in foreign experts to spend time addressing farmers problems was helpful in temporarily boosting technical capacity, but unsustainable due to the high cost involved (I#10). Fifteen participants added that whilst foreign expertise was often held in high esteem by Maldivian farmers, it sometimes failed to appreciate the context in which farmers operated (19 participants).

Research centres. The poor performance of MoFA's two agricultural research centres in providing agricultural knowledge to farmers was commented upon by a participant donor official and a participant MoFA official (I#147, 125). They noted that as the centres were based in the northern and central part of the country, their geographical outreach should have been sufficient to assist many farmers in these locales. However, they acknowledged that budgetary constraints resulted in the centres being poorly staffed and under-resourced. This had the effect of providing a limited service to farmers in terms of technical training, and in conducting adaptive and applied research trials from which farmers may benefit (I#147, 125).

Training and pilot projects. Despite the limitations on providing agricultural knowledge to farmers, a MoFA official commented upon the training and pilot programmes delivered to farmers by MoFA:

> Because we have such a small extension service with a small budget, we cannot get to all the islands to see all of the farmer's problems. So, we ask islands to bid for training courses that they think will be useful for their farmers. Then we decide to go to the islands with the highest number of farmers asking for help. We train in many areas like IPM, composting, business management, hydroponic cultivation and so on. If the training goes well, we can sometimes follow up with a pilot project to put the training into practice. Farmers like this

> because it shows them what they have learnt. We aim to reach about one thousand farmers per year with training and pilot projects (#120).

Participant farmers were generally receptive to MoFA training and pilot projects, particularly if they addressed specific problems being encountered. However, where this did not happen, participants often treated the training with mild indifference (O#107). The timeframe attached to training was also of note to many participant farmers, where extended periods of stay on an island by a trainer was preferred. A MoFA official commented on this situation when he recounted that a poultry technician from India had stayed on one island for a year showing farmers how to rear day old layer chicks into fully-grown laying birds. He noted that the community were extremely supportive of the technician and did not want him to leave the island (I#125).

Information media. Twenty participant farmers noted that knowledge transfer took place through the mediums of television and radio, where MoFA information programmes provided guidance to topical problems encountered by farmers (27 references). A participant MoFA official commented that the agricultural information broadcasts were generally well received but farmers still preferred MoFA visits to islands:

> Voice of Maldives broadcasts a radio farming information programme once a week at 2.00 pm, and farmers can phone in and speak to a panel of experts about their issues. I think most farmers find it helpful, but we get the feeling that the farmers really want us to come to their islands and show them how to do things (I#53).

A holistic approach to MoFA assistance Thirty-one participants in this research noted that MoFA assistance for building agricultural knowledge should be accompanied by practical components such as equipment and materials in order to assist use of the knowledge (38 references). In a discussion with ten participant farmers, eight farmers observed that providing knowledge to farmers without providing the means to test its application was ineffective as the knowledge would probably not be trialled. As noted by one participant farmer in the discussion: "All we do is listen and listen…we have no way of making this knowledge work for us, so we need help to put it to work in projects" (D#8).

In response to commentary on the request for a more holistic approach to MoFA assistance, a participant donor official noted that most donor interventions to the agricultural sector did consist of technical and practical contributions: "It is our [IFAD] policy that through technical expertise, training, and pilot projects, we supply the beneficiaries with a combination of knowledge, equipment, and materials, and sometimes funding" (I#147). Whilst MoFA and its donor partners were mindful of providing a combination of agricultural

knowledge with the means for farmers to test its practical application, a participant MoFA official observed that knowledge deficits would probably continue to exist amongst farmers until the GoM introduced more agricultural teaching in schools, and funding for extension services was increased (I#10).

**Sharing knowledge through friendship:** Thirty-one participant farmers discussed island friendship networks where members of the farming community would share their agricultural knowledge with each other, and with prospective farmers (39 references). Six young participant farmers noted that whilst receiving some assistance from MoFA in disease and pest control, most assistance came from their parents and elders of the island involved in farming; this was particularly the case for pesticide usage (D#21). A participant farmer/restaurateur also commented: "The other farmers used to come to my plot in the evenings and tell me to do this and do that. They showed me how to save water by using pots for planting, and to use coconut husk to keep the soil around the plant damp" (I#37).

Sixteen participant farmers noted that agro dealers based on their island were also helpful in providing guidance in the use of farming inputs, and in dealing with disease problems in plants (18 references). A participant agro dealer noted: "We ask farmers to take a picture of the problem on their phone and show us. We can also sometimes visit their farm to look at the problem. Then we give the right medicine (I#101). In a similar vein, participant members of a women's development committee noted that they had shared knowledge gleaned from MoFA in building greenhouses (D#25).

Knowledge transfer was also undertaken by a few well-known farmers visiting different islands to speak to other farmers about their farming experiences. One such participant farmer recounted how she had been invited to numerous islands in neighbouring atolls in order to share her farming experiences: "It's good to share this information, but my problem is that I don't have anyone to visit me and give me new information so I can pass on new knowledge to farmers. I need someone to help with this (I#133).

Eighteen out of twenty-four participant Bangladeshi agricultural labourers interviewed in this research commented on their sharing of agricultural knowledge between each other on different islands (25 references). In a discussion with seven labourers, five noted that much of their discussion was framed within comparative farming methods between the Maldives and Bangladesh (D#22). One of the participant labourers noted: "We tell each other stories

about what is happening on our different farms in Maldives, and we see how this is different to farming in Bangladesh" (D#22).

One of the most telling comments underscoring the importance of friendship networks came from a participant boat captain commenting upon the need to cultivate friendships in the marketplace in order to sell produce: "When our island people are in the market place buying and selling, they are meeting many people, and they all get to know each other, and then the friendship starts. You can make new friends easily, and it is helpful for selling" (I#35).

**Self-help:** Eleven participants in this study believed in self-help when dealing with challenges in farming (14 references). Six of these participants further noted that self-help builds resilience against institutional dependency but accepted that self-help often resided in the capacity to fund external assistance (11 references). In explaining this position, a participant ex-commercial farmer noted:

> Our farm brought in a PhD agricultural researcher from India to help us develop the best water conservation method for our fields. We placed coco peat under the seed when we planted, and then covered with sand. This helped to retain water. We do not have to rely on MoFA to do these things for us because sometimes if we do, there is a catch and we end up having to do everything their way to get the help. We can make our own arrangements (I#121).

A participant MoFA official applauded self-help initiatives of some farmers noting that their actions reduced the burden upon MoFA extension services, and further acted as an information hub for other farmers experiencing challenges. The official noted: "They're established farmers now, and probably know more about the problems they face than we do. They can also help others" (I#125).

Within the remit of self-help for farming challenges, sixteen participant farmers discussed their use of the Internet in sourcing agricultural knowledge, noting that although agricultural information was accessible, its accuracy and applicability to their situations had to be examined carefully (17 references). A participant MoFA official summed up this concern: "The Internet is used by a lot of farmers, but the problem is sometimes the information given is not relevant to the farmers in Maldives, but they do not know that, so they try things that sometime do not work, and then call us to help them (I#125).

**Subcode 10b**: ***Incentives for agriculture including: subsidies; regulation; land tenure reform; simplification of bureaucracy; private sector participation.***

Seventy-one participants in this research discussed incentives that could build agricultural capacity in the Maldives (105 participants). These included: agricultural subsidies; new regulation;

the reform of land tenure; the simplification of bureaucracy; and, the participation of the private sector in the agricultural sector.

**Subsidies:** Thirty-eight participants commented on the agricultural subsidy that was provided by the GoM to farmers during 2012-13 in order to stimulate agricultural production into becoming the third pillar of the economy after tourism and fishing (44 references). The subsidy amounted to approximately MVR6,000 ( 300) per farmer, per annum, for a two-year period, and took the form of vouchers for farming inputs such as seed and fertilisers which were redeemable through approved agro dealers either in Male', or on the islands (O#139). A discussion with five participant farmers on a large agricultural island noted that while the farming community welcomed the subsidy at the time, the distribution of the vouchers had led to corrupt practices whereby non-farmers had acquired and sold fertilisers through the voucher system (D#26). The participants further noted that the termination of the subsidy in 2014 had resulted in some hardship as farmers had come to depend upon its operation (D#6). One participant farmer in the discussion noted: "We believed the subsidy would continue and help us. Then it stopped because government could not afford it anymore" (D#6).

A participant MoFA official commented that while subsidies, such as the relaxation on import duties for farming inputs, had been considered in the past both to assist farmers experiencing hardship, and to stimulate new farming activity, their inevitable demise was due to budgetary constraints. The official further added that multilateral lenders providing budgetary support to the GoM viewed subsidies as both unsustainable and a distortion of markets (I#129).

**Regulation:** Thirty-three participants commented upon the need for MoFA to boost regulation in three main areas: (i) sanitary food handling; (ii) hazardous chemical usage; and, (iii) stabilising local markets (61 references) (O#133).

<u>Sanitary food handling.</u> In terms of food health and sanitation, twenty-one participants called for GoM directives on the sanitary handling of food, particularly in relation to cool storage and refrigeration facilities which would reduce food decomposition during harvesting, distribution, and retailing (25 references). Frequent reference was further made by participants to the sometime unsanitary conditions of the fledgling livestock sector where eating eggs were without lay date stamps, and the slaughtering of poultry and goat meat

was undertaken in backyards (O#139). A participant farmer engaged in hydroponic cultivation noted:

> Many places where food is handled are dirty with flies. Local people did not mind this too much in the past, but now they see supermarkets and cool stores in Male' and think all the food in our country should be handled in this way. The government needs to do the HACCP[46] regulation for food; it already does this for fishing I think (I#5).

Although not relating to food handling comment was made on the need for sanitary and phytosanitary measures on plant and animal imports, particularly as many participants were fearful of invasive species entering the country through materials such as organic fertilisers (O#139).

Hazardous chemical usage. Eighteen participants noted that regulations needed to be imposed and enforced regarding the use of pesticides and fertilisers in order to protect the environment and human health (24 references). Participants noted that the only regulation that appeared to be enforced in this area dealt with materials such as chemical fertilisers that could be used in explosive devices. In such cases, permission for importation had to be granted by the Maldives National Defence Force.

A participant agro dealer noted that agro dealers and MoFA were aware of banned chemicals in pesticides and fertilisers, but as many farmers directly imported their own products, it was almost impossible to monitor and impound banned chemicals (I#101). The participant agro dealer added that this created a dangerous situation as the authorities and the public had little knowledge of what harmful chemical residues resided in locally produced food.

Stabilising local markets. An island council president conveyed a widely held view by many participants in this research regarding the need for regulation of local food markets, particularly in relation to the control the imported food flowing into the Maldives. The participant contended that local production could be coordinated to minimise local food surpluses and shortages and thus lessen the reliance upon imported food (I#59). Echoing the need for a national crop production strategy, a participant commercial farmer posited that the small size of the local market would assist in planning such a strategy. He added that farmers could grow crop types and quantities within prescribed timeframes as directed by the state. The farmer concluded that such a strategy could assist in ensuring product

[46] Hazard analysis and critical control points (HACCP) aims to guarantee food safety through a systematic contamination prevention process.

continuity of supply to the market, and a national quality and pricing standard comparable to that food that was imported (I#126). The farmer later admitted that his idea was premised upon collective action directed by the state which may be at variance with a more market orientated approach favoured by others.

Regulation of input markets was discussed by twelve participants who contended that there was a need to stabilise farming input pricing and availability (17 references). This, they contended, could be achieved by relaxing import duties for farming inputs such as seed and fertiliser. In assisting the stabilisation of farming input markets, eight participant farmers called for an agricultural US dollar fund to be underwritten by the GoM where farmers could draw on dollar reserves to fund the importation of farming inputs; they contended this would reduce price spikes when stocks of farming inputs were low.

**Land tenure reform:** Two participant commercial farmers recounted the view held by many participant farmers in this research when they posited that there were two main incentives required to activate the commercialisation of agriculture in the Maldives. These were: (i) a review of land tenure on inhabited islands in favour of secured agricultural leases where the lease period and rent were guaranteed for a prescribed period of time; and (ii) a reduction in the rents of agricultural leases on uninhabited islands (I#102, 110). Commenting on these incentives, a participant farmer noted: "It's not fair that big companies get a whole island on an agricultural lease for a set time and rent, and small farmers on inhabited islands get small pieces of land with no similar security. The Island Office can take back the land when they want to" (I#102). A participant MoFA official elaborated on this situation:

> MoFA thought about reforming land rent agreements on inhabited islands, but as most of the land is rent free, farmers seem happy. The downside is, the land can be taken back when needed by the Island Council. This is a problem for big farmers who don't want to invest more because the investment may be lost (I#125).

Complaints over underutilisation of agricultural leases on uninhabited islands were noted in subcode 7e, *Land constraints: availability; underutilisation; water resources; and, unsecured tenure.* However, there was less concern articulated over the high price of agricultural leases on uninhabited islands other than a general call by participant farmers to make such leases more affordable to ordinary farmers. As noted by a participant young farmer: "We would like to have a go at getting a farming island for our family to do a good farming business, but the Ministry [MoFA] want too much money, so only the rich people get those islands" (I#54).

**Simplification of bureaucracy:** Fourteen participant farmers commented upon confusing and time-consuming bureaucracy where MoFA and intersecting ministries often held differing views relating to aspects of farming activity (17 references). A case in point was discussed by a participant commercial farmer who registered his frustration over the importation of agricultural machinery:

> We know we should get duty-free status for the machine, but Customs will say no. Then we have to go to MoFA, and the Ministry of Economic Development so they can send letters to Customs saying the machine should be duty free. This muddle goes on and on with each one saying something different (I#115).

Eight participants suggested that a solution to bureaucratic impasses should be a one stop shop for those farmers either already engaged in agriculture or those prospective farmers (9 references). As noted by one participant farmer in a discussion with five participant farmers: "If we can get the information and approvals from one office, we can stop running around and spend the time on our farms" (D#4).

**Private sector participation:** Sixteen participants agreed that private sector participation in the agricultural sector could act as a catalyst in driving the sector towards commercialisation. However, the participants also noted that attempts to stimulate the interest of private sector participation in agriculture, particularly through the FADiP initiative where concessionary rated finance was offered, had failed (19 references). In commenting on this predicament, a participant commercial food distributor noted:

> We like to be in companies by ourselves, or with close family members and friends, and not a lot of strangers. The farmers are the same because they like to farm by themselves or with families. They do not want to farm with us, and we do not want to farm with them. The people at MoFA know this, but I think they were pressured to try and join us for FADiP (I#110).

A participant MoFA official acknowledged that trying to incentivise private sector participation in agriculture was problematic particularly as investment traditionally gravitated towards the higher and more stable returns generated through tourism. The official continued, that while agriculture in the Maldives needed to attract established business interests in order to commercialise its activity, the strategy of joining the efforts of subsistence farmers to donor funding and commercial food distributors would need to be re-examined.

**Subcode 10c:** ***The assistance given to farmers had mixed results (unsustainable project interventions, dependency and entitlement resulting from MoFA assistance, unsuitable cooperative models, corporate social responsibility programmes).***

Sixty-one participants in this study commented upon the impact of the assistance given to farmers from MoFA particularly in relation to unsustainable project interventions, dependency upon the state and the accompanying sense of entitlement by beneficiaries of the assistance, and the inappropriateness of cooperative models (81 references).

**Unsustainable project interventions:** Forty-two participants in this study stated that when MoFA/donor assistance stopped for a particular project, the project invariably ceased to function after a short period of time (49 references). In this way, many participants appeared to believe that MoFA's efforts in promoting sustainable agriculture were in themselves unsustainable. Explaining this situation more fully, a participant cooperative member noted:

> The project may carry on for a short while after MoFA have stopped helping, but not in the same way as it was supposed to. Greenhouses will be used for cabbage growing on the ground instead of lettuce growing with hydroponics. In the end, the project will just fizzle out because the farmers will lose interest without MoFA pushing them (I#123).

Twenty-three participant farmers agreed the main reason for the discontinuance of projects was the capacity deficit of local management after MoFA's exit. Such deficits included a lack of administration skills, corruption, and disinterest (32 references).

A participant MoFA official acknowledged the poor sustainability record of their project interventions, agreeing that it was embarrassingly the case that when the MOFA assistance cycle was completed, so followed the demise of most projects (I#125). Another participant MoFA official noted the reasons for project failures could be attributed to the provision of assistance that was a variance to the local farming context where assistance was more tailored to what MoFA's donor partners would fund, rather than what the farmers actually needed. The official continued:

> It's usually very easy to sell the projects to the island communities because we can attach funding, equipment, and technical help. So, if our donor partner is offering US$60,000 ( 46,500) to a poor island community to set up greenhouses to grow lettuce, then of course the islanders will agree to the proposal, and take the assistance. The farmers will not be that bothered when it all fails (I#129).

**Dependency and entitlement resulting from MoFA assistance:** Nineteen participant farmers continued the sentiment expressed in the preceding comment when they noted that because project interventions were invariably led and driven by MoFA rather than the farming community, many farmers had come to depend on MoFA assistance, and indeed,

feel entitled to such assistance in addressing their farming needs (23 references). Elaboration of this point came from a discussion with four cooperative members who had been informed by MoFA that assistance would be available to farmers on their island if they formed a cooperative (D#16). Following on, the participants noted that MoFA assisted with the following actions in establishing the cooperative: cooperative registration; membership recruitment; business plan compilation in order to access funding; arrangement of the purchase and delivery of farming inputs such as greenhouses, irrigation equipment, fertiliser, and so forth; provision of training for the management of greenhouses; and, the negotiation of sale contracts for produce with neighbouring resorts.

A participant MoFA official acknowledged that if they did not adopt a robust approach to the implementation of the cooperatives, they were unlikely to materialise, certainly within the timeframe of the project funding (I#125). Another participant MoFA official noted that despite MoFA's willingness to assist in establishing cooperatives, they did on occasion terminate assistance to farmers in the event of non-performance (I#53). The official added that at least three cooperatives had MoFA funding withdrawn due to non-performance ranging from substantive project deviation, to a loss of support by cooperative members.

Whilst this action demonstrated the level of control MoFA had over farmers, it further provided an insight into the state led dependency culture endemic within Maldivian agriculture. Integral to this culture, was the sense of entitlement held by many farmers where MoFA was regarded as being obliged to do more to assist farmers. In illustrating the notion of entitlement, twenty-one participants affirmed that farmers particularly felt MoFA should be assisting them more in connecting with the markets (27 references). This point was highlighted in a discussion with six participant young farmers concerning the lack of transportation from their island to Male' (D#21).

The most blistering commentary on farmers' sense of entitlement came from a participant resort manager who recounted how his resort had funded a melon growing project for the neighbouring island (I#105). The manager noted that in addition to funding operational expenses, they also agreed to purchase the melons back from the community. The resort manager noted that community soon began to submit more funding requests for projects requiring machinery and migrant labour. The manager contended that many of these projects could be undertaken at a considerably reduced cost by local islanders if they were sufficiently motivated to do so. The manager further argued that the resorts offer of

assistance was seen as an extension of government assistance to communities, hence communities thought there was an obligation by the resort to provide assistance (I#105).

**Unsuitable cooperative models:** MoFA noted that the FADiP programme established eight agricultural cooperatives between 2011 to 2014, of which only one was fully functional by 2017 where it provided farmers on a large agricultural with an option for purchasing inputs and selling produce (I#129). MoFA noted the relative success of this cooperative was mainly due to its location on an established agricultural island where there was considerable momentum behind farming activity. In the case of the other cooperatives, one MoFA official commented: "I think we now have to stop trying to drag farmers into a cooperative model and think of something else!" (I#125).

A participant commercial farmer had an equally pessimistic view of the FADiP cooperative model focussing her criticism on the programme blueprint espoused by the donors. She noted:

> Why do the donors keep targeting community agriculture through cooperatives when nobody wants them? People want to farm by themselves. Give the money to individuals and farming families. Better to give money to a group of ladies who have been running a café for twenty years and let them grow some of the items they need to make the food. They all work nicely together, and it's not something forced together because somebody in Male' or Rome thinks it is a good idea (I#121).

The same participant commercial farmer continued her view of inappropriate donor assistance when she noted that an abundance of mangoes on one island was met with the suggestion by a visiting donor mission that a cooperative should be established to market the mangoes. The participant countered that the farmers did not want a cooperative, but instead required a juicing machine in order to supply fresh mango juice to local outlets (I#121).

Community cooperative clashes**.** Further comment on the unsuitability of existing agricultural cooperative models came from a participant cooperative committee member/school headmaster. This participant recalled that MoFA had faced considerable difficulty in trying to encourage traditionally opposing villages on the same island to amalgamate their dysfunctional cooperatives in order to access FADiP assistance and rejuvenate the cooperatives operation (O#3). He continued, that despite MoFA's offer of equipment and training incentives, the communities were not interested in amalgamating their operations. Opposing communities on large islands appeared on a further two sites visited during this fieldwork, where cooperative greenhouses were left to fall into ruin rather than organising a joint community effort to assist in their rehabilitation (O#3).

**Corporate Social Responsibility programmes:** This research noted that corporate social responsibility (CSR) programmes assisting island agriculture were operated by four out of the nineteen tourist resorts visited during the fieldwork (O#96). Two of the beneficiary islands noted that they had received grants and soft loans through resort CSR programmes in order to purchase greenhouses for the production of lettuces, which could then be sold back to the resorts (O#96). A participant cooperative manager noted that his cooperative had received an interest-free loan of US$16,000 ( 13,000) from the resort for a period of ten months in order to purchase four greenhouses. The manager explained that the beneficiaries of the funding were selected by lucky dip from the cooperative membership; the beneficiaries had to repay the US$4,000 ( 3,250) for each greenhouse to the cooperative over a two-year period at 2% interest per annum. The loan was then repaid by the cooperative to the resort. The manager proudly noted that the loan had been repaid in full within the specified time period (I#67).

Resorts were further noted as sharing knowledge with island communities on food management, particularly concerning the storage and refrigeration of local produce grown on the islands. A few resort chefs also demonstrated alternative [and healthier] ways of preparing local dishes minimising the use of cooking oil (O#96).

Of the four resorts directing their CSR activities towards agriculture, all regarded their action as more of a welfare initiative rather than a business relationship. However, two of the resorts noted that they would welcome established supply chains from the island farming operations they were assisting (O#61). MoFA noted the tremendous potential of closer linkages between island farming and neighbouring resorts adding that a significant percentage of resort food requirement could be sourced from neighbouring inhabited islands (O#139). The official further noted that vehicles through which this potential could be realised were still to be discovered (I#125). Another participant MoFA official suggested that tourist leasehold agreements should be required to purchase a percentage of their food requirement from local islands, although this was regarded as being generally unenforceable (I#53).

**Subcode 10d:** ***Improved accessibility to farming technology and infrastructure.***

Thirty-one participants expressed the view that improved accessibility to farming technology and infrastructure was required to assist farmers in building agricultural capacity (37 references).

**Technology:** Improved access to farming technology was cited by twenty-eight participant farmers as being a priority in building agricultural capacity in the Maldives (31 references). Participants mainly defined issues of accessibility through the availability and affordability of utilising technology (O#114). Throughout this research, participants revealed that their understanding of technology was more linked to modernity utilising computerised systems for farming rather than alternate methods where traditional practices were refined to optimise output (O#114). It was further noted that participants associated modernity with poly tunnel greenhouse production utilising hydroponic feeding systems.

Foremost in the commentary for improving access to technology was the need for atoll laboratories where disease and pests could be identified and treatment recommended (16 participants, 26 references). As noted by a participant island council president: "A laboratory is very important for this island because we do a lot of agriculture here, and we are always having fungus problems. We need to know the real problem so we can give the right medicine and get rid of the fungus" (I#40). As noted in subcode 7d, *Limited access to farming inputs including: equipment; pesticides; seeds, and, fertilisers,* many participants in this research argued that farming inputs should be more accessible. While MoFA noted that they had previously maintained a shop in Male' where farmers could purchase some of the required farming inputs, the private sector had now assumed the role of supplying farming inputs into the Maldives (O#114).

**Infrastructure:** Nine participant farmers noted that GoM should improve infrastructure on the islands to better accommodate agricultural activity. Within this remit, desalinated water and electricity and were highlighted as requisite utilities (10 references). Within the discussion of power generation for electricity, participants further expressed their interest in solar energy to power greenhouses (8 references).

An outlier comment from a participant expatriate consultant commented upon the need for the state to provide specific plant and equipment to catalyse the development of certain agricultural sectors (I#85). He referred to his work in assisting pilot egg-laying projects and noted that a national feed mill was required to substitute costly poultry feed imports. He posited that such a facility would stimulate local egg production in particular, with farmers feeling more secure that local feed was readily available. However, the consultant conceded that such spending by the GoM was unlikely due to budgetary constraints, and even less likely by the private sector who had yet to be convinced of agriculture's profitability (I#85). A participant MoFA official agreed that GoM would be likely to commit to such spending but

offered the solution of a buy back mechanism by farmers if and when GoM decided to exit an infrastructure project they had financed (I#53).

## Code summary

Box 10 presents the key points to emerge from Code 10, *Institutional assistance for agriculture needs to be re-orientated in favour of farmers' needs.*

**Box 10. Key points from code 10**

- **MoFA filling in farmers' agricultural knowledge gaps:** Knowledge gaps in agriculture were accepted by all participants in this research, with most positing that MoFA should re-orientate its assistance based on farmers actual needs rather than the requirements of the donors who were funding much of the assistance. Training and pilot projects were noted by many participant farmers as useful but they argued that training should last for a longer period of time and be complemented by farming inputs to demonstrate the practicality of what was being taught. Note was made of friendship networks and self-help in accessing agricultural knowledge. Bangladeshi labour confirmed its own knowledge information network amongst farm labourers on different islands.
- **Incentives for farming:** Subsidies on farming inputs were given and withdrawn due to budgetary constraints. Participant farmers suggested that a reduction in import duties for farming inputs (seed, fertiliser, pesticides) would incentivise farming activity. Further incentives included regulations covering food handling (harvesting, distribution, and retailing), and enforceable controls on the importation and usage of hazardous chemicals used in agriculture. Regulation limiting food imports was also noted, as was the accompanying theme of regulating local markets in order to avoid price and supply volatility. Simplifying the bureaucratic process involved in establishing and operating farms was noted. The encouragement of private sector participation was seen as a catalyst in driving subsistence agriculture towards commercialisation.
- **Reform of land tenure on inhabited islands:** Participant farmers requested security of tenure on their farming plots where leaseholds stipulated leasehold length and rental amount. There was an indication that this may lead to improved land stewardship.
- **Unsustainable project interventions:** Participants widely commented upon dysfunctional agricultural projects where island mismanagement and general disinterest had seen the demise of many projects. Participants farmers argued that as the MoFA assistance could not be sustained due to technical knowledge deficits and budgetary constraints, there was little hope for the sustainability of the projects.
- **Dependency and entitlement:** Some participants noted that farmers had become dependent upon the state to provide farming assistance. When this assistance was not forthcoming their sense of entitlement was affronted. A dependency culture in farming was noted as being endemic and fuelled by state led assistance.
- **Unsuitability of the cooperative models:** Participants noted that the collective ethos of cooperatives did not fit within the individualistic and family farming context of the Maldives. Assistance was suggested for those farmers who demonstrated a commitment to farming and had achieved some success rather than the creation of generic cooperatives.

- **Corporate Social Responsibility (CSR) from resorts:** Participant farmers noted that some cooperative members had received financial assistance through resort CSR programmes. Resorts regarded CSR more as a welfare initiative than the development of a business relationship.
- **Increased access to technology and infrastructure:** Participant farmers associated technological advance mainly with greenhouse cultivation utilising hydroponic feeding systems. Specific mention was made by participants of the need for plant laboratories to identify plant disease and to suggest remedial action. Increased access to in power and desalinated water was requested by participant farmers as necessary to develop island farming infrastructures. State led establishment of strategic agricultural assets was suggested but largely discounted due to GoM budgetary constraints.

## 6.3. Chapter summary

Participants contributing to this chapter were generally clear in their desire to see MoFA, as the main provider of assistance to the agricultural sector, recalibrate its assistance to farmers away from development agenda goals, to the direct needs of farmers. Such an approach would see the extension services of MoFA spend lengthier periods working with farmers in the field on the implementation of new farming practices, the introduction of new farming equipment, and providing some solutions to farming challenges. Participants were aware of the budgetary constraints hindering this ideal extended to the training for the extension services. However, participants felt that a more intimate relationship between MoFA and the farmers would create a keener appreciation of island agriculture which could be conveyed to those donors wishing to assist MoFA and the farmers.

The recalibration of the assistance requested by farmers of MoFA was multifaceted and included: the provision of increased agricultural knowledge; incentives to invest in agriculture such as improved regulation dealing with the importation of harmful chemicals; encouraging private sector participation as a catalyst in promoting commercialisation; the reform of land tenure for farmland plots on inhabited islands; and, a focus on directly assisting community farmers rather community structures such as cooperatives. Whilst such a recalibration was unlikely to reduce the dependency culture which had grown around MoFA's activity in supporting farmers, a closer and more targeted MoFA assistance provided to farmers may create sufficient agricultural capacity to enable a reduction in future assistance. This may further assist in defusing the farmers feeling of entitlement to state led interventions.

# Chapter 7. Discussion. Farmers in the Maldives building agricultural capacity through sustainable means.

## 7.1. Chapter introduction

Chapter seven discusses and answers the main research question: *'How can farmers in the Maldives build agricultural capacity through sustainable means*?'. This was undertaken by examining the analysis relating to the three supporting questions as contained in chapters four, five, and six respectively:

- Chapter four – *What do farmers in the Maldives understand by the terms 'sustainable agriculture', and 'building capacity in agriculture'?*
- Chapter five - *What are the key factors encountered by farmers in the Maldives?*
- Chapter six - *What measures do farmers in the Maldives believe will help build their agricultural capacity through sustainable means?*

Analysis from the three supporting questions in this research intertwined with the relevant literature and my experience of working with Maldivian farmers over a fifteen-year period guides the discussion in this chapter.

## 7.2. Overview of the main findings.

Analysis of the coding in the findings chapters four, five, and six resulted in the emergence of ten codes comprising forty-three subcodes. The ten codes are detailed in table 15 in descending order of greatest number of participants.

**Table 15. Codes in descending order based on the greatest number of participants.**

| No. | Codes | No. of participants | No. of references. |
|---|---|---|---|
| 7 | *Key production challenges include knowledge gaps in best practice farming, and limited accessibility to technology, farming inputs, land, and funding.* | 586 | 1,336 |
| 8 | *Farmers have difficulty in connecting with the market in order to sell their produce.* | 303 | 462 |
| 10 | *Institutional assistance for agriculture needs to be re-orientated in favour of farmers' needs.* | 241 | 318 |
| 4 | *Farm labour mainly comprised individuals within family farming units assisted by migrant workers.* | 219 | 391 |
| 1 | *'Sustainable agriculture' means: profitable farming over a long period; soil and water conservation; enhanced access to input resources; and, stable links to the market* | 199 | 261 |
| 5 | *The sociocultural stigmatisation of agriculture, and lack of agricultural learning in schools, contributes to the absence of youth in agriculture.* | 190 | 365 |
| 3 | *People farm primarily to make a profit.* | 177 | 214 |

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| 6 | *Farmers believe that reducing food imports will boost local production.* | 143 | 196 |
| 9 | *People believe fresh fruit and vegetables contribute to good health, but they are often omitted from diet.* | 118 | 163 |
| 2 | *'Building capacity in agriculture,' means acquiring agricultural knowledge, and enhancing access to resources in order to increase production and profitability.* | 89 | 113 |

Analysis of the ten codes in table 15 saw the emergence of six core codes as detailed in table 16. Appendix 10 demonstrates the coding reduction where ten codes in table 15 were reduced to six core codes in table 16.

**Table 16. Core codes in descending order based on greatest number of participants.**

| No. | Core codes |
|---|---|
| 1. | **Poor market connectivity** |
| | **The relevance of markets for farmers.** Participant farmers noted that markets were required to translate farming effort into financial gain. Local farmers had poor access to desirable tourist markets. Tourist markets were mainly supplied with imported food.<br>**Unfair competition from lower foreign food production costs:** Participant farmers noted lower costs of production (farming inputs, labour, utilities) for farmers in neighbouring countries where economies of scale and efficiencies in production were more easily achievable. This resulted in cheaper food entering the Maldives.<br>**Transportation.** Cost & frequency of transportation for food imports was good. Cost & frequency of transportation for local production close to the Male' hub (buying inputs/selling produce) was good. High cost & poor frequency of transportation for islands further away from Male'.<br>**Reducing food imports to boost local production.** Participant farmers believed that reducing imports would automatically boost local production. Quotas and tariffs could reduce food imports. MoFA countered that quotas and tariffs would distort the market to the detriment of consumer pricing.<br>**Customer scepticism concerning local food production**. Food traders and resort customers believed that local food production capacity could not compete with food imports. Traders and resorts also believed that increasing local productive capacity would be problematic due to the lack of local business acumen and expertise in food production. Customers believed that commercial food production was required to supply commercial food customers such as tourist resorts.<br>**Poor accessibility to farming inputs market.** Farming inputs (seed, fertilisers, equipment etc.) were regarded by participant farmers as being expensive and not readily available. Agro dealers supplying inputs noted the rising importation costs of inputs coupled with the limited US Dollar availability to fund imports**.** In a few instances, increased access to inputs was linked to increased agricultural sustainability.<br>**Food traders and agro dealers regarded with suspicion:** Both parties were regarded by farmers as necessary in connecting them to factor and producer markets. However, farmers believed both parties sometimes manipulated pricing leading to price volatility resulting in lower producer prices and higher input prices. This was regarded by many farmers as sharp practice. Participants further acknowledged that farmers were slow to respond to price and supply volatility in the market, whereas, food traders were quick to capitalize on product surpluses and shortages both from local and external supply points.<br><br>**Number of participants: 818, number of references: 1476.** |
| 2. | **Enhanced MoFA assistance required for farmers.** |
| | **The acquisition of greater agricultural knowledge.** Participants noted they required more knowledge in pesticide and fertilizer usage, best practice farming utilizing appropriate technology, and the impacts of changing weather patterns and how this linked to climate change. Teachers noted they wanted to see agricultural teaching in schools emphasising technology and farming profitability believing this would better stimulate youth participation in farming. General desire for the provision of specific information relating to farmers' needs / challenges as opposed to more generic information. MoFA assistance to fill knowledge gaps was limited due to their own knowledge deficits and budgetary constraints. The acquisition of agricultural knowledge was linked to building capacity towards a more sustainable agriculture.<br>**Improved regulatory support for agriculture.** Participants requested regulation for: pesticide usage; food safety and hygiene from farm to fork; reduction in food imports; and, control on the importation of plant and organic matter.<br>**Improved incentives to invest in agriculture.** Participants requested concessionary funding (low interest rate loans, low collateral requirements), provision of long leases for farmland on inhabited islands, and the simplification of bureaucracy intersecting with agriculture. |

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| | **Improved accessibility to farming technology and infrastructure.** Participants noted the desire for more greenhouses with hydroponic systems despite most existing cooperative greenhouses being dysfunctional. Increased infrastructural investment included support for: power generation, harbours, and desalinated water plants all of which have direct agricultural use.<br><br>**Number of participants: 607, number of references: 980.** |
| 3. | **Stigmatization of farming as a low-class activity.** |
| | **The dwindling respectability of farming.** Many participants regarded farming as a subsistence activity for the poor, a retirement activity for the elderly, a pastime for women, full time employment for migrant labour, an occupation for those males who didn't go fishing, hot dirty low paid work, and, largely devoid of youth participation. Traditionally, farming was not regarded as being as respectable as fishing, although the introduction of technology was hoping to change this perception.<br>**Community and youth stigmatization of agriculture as a low-class activity.** Participants noted traditional views of farming as being a low-class activity. Such views were prevalent amongst parents who wanted their children to work in an office rather than in the fields, and amongst the large sections of the community who regarded agriculture as subordinate to fishing.<br>**Lack of agricultural learning in schools.** Many participants posited that agricultural learning in schools would assist in destigmatizing agriculture as it informed of the profit potential in using technology. Teachers noted that youth would better respond to farming being viewed as a business.<br>**Youth preference for employment in tourism:** Youth expressed the preference for tourism and office-based employment. Tourism was perceived to offer more opportunity, status, and connection with desirable western lifestyles. Youth were aware of the parental dislike of farming as a future occupation for their children.<br>**Poor work ethic exhibited by some Maldivian men towards farming.** Participants acknowledged that Maldivian males would be unlikely to undertake agricultural labouring. Women and migrant labour were more likely to perform this task.<br>**The stigmatization of fresh food in favour of processed tastier food.** Youth stigmatization of farming was coloured by their general dislike of fresh vegetables/fruit in the diet, and preferences for 'tastier' processed food, despite being aware that fresh food was better for health. The serving of processed food such as fried chicken and noodles in restaurants was welcomed as a pleasant change from the home diet of fish and rice by restaurant customers.<br><br>**Number of participants: 401, number of references: 722.** |
| 4. | **Profitability motivates people to enter the food sector.** |
| | **If not for profit, for what?** Participants noted profitability was the main driver for engaging in agriculture. Profitability was associated with increased local production supplying stable markets that were unfettered by excess food imports. Many participants noted that breaking even was not an option for their farming effort, and they wanted to make a profit. Belief that moving from subsistence agriculture to commercialization would be profitable. The employment of technology in farming was associated with greater profitability.<br>**Recording profitability.** Subsistent farmers noted they generated a reasonable profit which was illustrated by the income and expenditure records they kept. According to MoFA, the accuracy of the farmers record keeping relating to profitability was unclear. Commercial farmers were unwilling to divulge if they were profitable. Food traders noted good profits.<br>**Profitability would encourage youth participation in farming.** Youth noted that the employment of technology to turn farming into a profitable business would attract them into agriculture.<br>**Trust and risk.** Profitability was associated with undertaking farming with trustworthy people. Trust was linked to the handling of money and negotiating with factor and producer markets. Families and individuals were deemed more trustworthy than cooperatives. Farming labelled as risky by institutional lenders due to variables such as pests and bad weather.<br>**Commercial agriculture.** Little was revealed in the research of the profit status of commercial farms. Many commercial farms were believed to be cross subsidized by associated companies.<br>**Sustainability and building capacity.** The notion of profitability formed the main participant understanding of the terms 'sustainable agriculture', and 'building capacity in agriculture' where expanded production would generate profitable farming. Profitability was associated with sustainability.<br><br>**Number of participants: 395, number of references: 533.** |
| 5. | **Farming is preferred as an individual and family orientated activity that is often assisted by migrant labour.** |
| | **Island life as a basis for individualistic and family farming.** Participant farmers generally preferred to avoid situations that could lead to the confrontation and jealousy that was evident in some Maldivian island communities. Hence, they farmed individually and with close family units. They also performed some farming functions such as land clearing and weeding with small numbers of good friends.<br>**The Maldivian family farming unit.** Farming was undertaken by individuals and with family farming units. Women mainly farmed household gardens and small field plots where they cultivated and harvested. Men assisted with heavy lifting and negotiated with factor and producer markets. Men also operated larger farms which were run as businesses employing migrant labour. |

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| | **The role of migrant labour.** Prominence of south Asian (Bangladeshi) labour in all aspects of the agricultural supply chain including: production; transportation of produce; and, marketing. Migrant labour acknowledged by participants as undertaking the majority of agricultural labouring. Some resentment over this prominence.<br>**An aversion to collective farming structures such as cooperatives.** Many participant farmers expressed an aversion to formalized farming structures such as cooperatives as they were regarded as a poor fit within the sociocultural context of island life where individualism was preferred over collectivised activity.<br>**Political capture.** Some participants noted that MoFA interventions could be perceived as extending political patronage to island communities who in return were expected to reciprocate with political support. Island hierarchies could influence farming activity, particularly in the marketing of produce outside the island, as they had commercial contacts and access to transportation.<br><br>**Number of participants: 219, number of references: 391.** |
| 6. | **Participants' understanding of 'sustainable agriculture' and 'building capacity in agriculture'.** |
| | **The term 'sustainable agriculture'**. 'Sustainable agriculture' was linked to longevity in farming using the words, 'continue', 'forever', and 'long time'. Participant farmers believed longevity in farming could only be achieved if farming was profitable. Therefore, profitability in farming would ensure that farming continued**.** Agriculture in the Maldives had been sustainable as island communities produced and traded sufficient food and for the islands survival. **(No. of participants: 199, no. of references: 261).**<br>**The term 'building capacity in agriculture'.** 'Building capacity in agriculture' was linked to enhanced access and use of resources such as farming inputs, technology, funding, and knowledge. The conflation of such resources would build productive capacity and increase profitability. **(No. of participants: 89, no. of references: 113)**<br>**Using both terms together:** Use of both terms together was not common. However, a few participants posited that building agricultural capacity would lead to profitability and thus sustainability. **(No. of participants: 12, no. of references: 18)** |

The six core codes formed the basis of the six-point farming framework which answered the main research question. The six-point farming framework is presented in table 17.

**Table 17. The six-point farming framework.**

- **Contextual understanding**. Improved cognizance of the sociocultural construct of farming on islands in the Maldives.
- **Individualism.** The acceptance and building of individualistic farming capacity.
- **Entrepreneurialism and profitability**. The capture of entrepreneurialism and promotion of profitability in farming.
- **Migrant labour.** The improved recognition and utilisation of migrant labour as a valuable resource for Maldivian agriculture.
- **Knowledge transfer.** The greater dissemination of agricultural knowledge, particularly to the youth.
- **Production and marketing connectivity**. The establishment of local production hubs that are competitive with food imports.

## 7.3. Structure of the discussion

The structure of the discussion is detailed below:

- The analysis derived from the first supporting question as discussed in chapter four was presented in core code 6 and is discussed in section 7.4. of this chapter, *Participants' understanding of 'sustainable agriculture' and 'building capacity in agriculture'.*
- The analysis derived from the second supporting question as discussed in chapter five was presented in core codes 1, 3, 4, and 5, and is discussed in section 7.5. of this chapter, *the key factors encountered by farmers in the Maldives.*
- The analysis derived from the third supporting question as discussed in chapter six was presented in core code 2 and discussed in section 7.6. of this chapter, *Measures farmers in the Maldives believe will help build their agricultural capacity through sustainable means.*
- The analysis derived from the three supporting questions informed the main research question which is discussed in section 7.7. of this chapter, *how can farmers in the Maldives build agricultural capacity through sustainable means?*

## 7.4. Participants' understanding of 'sustainable agriculture' and 'building capacity in agriculture'

This section of the chapter examines the analysis from chapter four as presented in core code 6, *Participants' understanding of 'sustainable agriculture' and 'building capacity in agriculture'*. The purpose of this section was to establish the participant farmers' baseline understanding of the terms 'sustainable agriculture', and 'building capacity in agriculture' and how this understanding relates to the main research question.

### The term 'sustainable agriculture'.

**Historical linkages to sustainability in agriculture.** As has previously been discussed in the literature review *2.3. Understanding the terms 'sustainable agriculture', and 'building capacity in agriculture'*, Bell (1883), Butany (1974), Husain (1976), and Maloney (1980), all commented upon the presence of agricultural production in the Maldives noting that it had endured throughout the centuries providing sustenance to its people. Production was based upon the cultivation of local fruit and vegetable varieties interspersed with naturally occurring crops such as coconut which Battuta described as being in abundance and

providing milk, oil, honey, and confectionary (Husain, 1976). Bell (1883) added that the main starch staple of rice had to be imported from southern India, as it could not be grown easily in the Maldives. Accompanying the references to agriculture and food production, De Laval, Moresby, and Young, confirmed in Bell (1883) that although there was access to food, much of what was consumed had a limited nutritional content.

A level of agricultural sustainability was then evident in Maldivian agriculture where a small population could be satisfied by local food production that was in some part supplemented by the importation of starch staples. However, in current times, an expanded Maldivian expatriate worker and increasing tourist population, placed considerable pressure upon local productive capacity resulting in its diminishment as the main food provider in favour of imported food from neighbouring countries and further afield. While agriculture was still sustainable at a low productive level in the Maldives, it was imported food stocks that now constituted 90% of the national food requirement (WTO, 2009). The Maldivian food security status then appeared to be predicated more on the capacity to purchase food imports rather than the capacity to produce food locally.

**Participant farmers' understanding of 'sustainable agriculture'.** Participant farmers in this research articulated a variety of words that conveyed their understandings of the term 'sustainable agriculture'. Words used in describing this term included: 'continue'; 'forever'; and, 'long time', and related to the belief that longevity in farming was tantamount to sustainability in agriculture. Accompanying this understanding, participant farmers further noted that longevity in farming would exist if farming were profitable. Many participant farmers simply noted that if they could not derive a profit from farming, there was little point in continuing with its activity. They further explained that this rationale was underpinned by the hardships and timeframe in bringing a crop to the market; this was in comparison to the relative ease and immediacy of generating a financial return through fishing. Further discussion on factors contributing to profitability such as stable markets and the utilization of technology, were featured in core code 4*, Profitability motivates people to enter the food sector.*

As part of the understanding of the term 'sustainable agriculture', some participant farmers touched on their desire to minimise environmental degradation caused by indiscriminate chemical pesticide and synthetic fertilizer usage. Such degradation was noted as a threat to soil and freshwater resources, terrestrial and marine biodiversity, and human health. Participants suggested ways in which such threats could be mitigated including the

implementation of composting and integrated pest management. Discussion on the impact of chemical pesticide and fertiliser misuse appeared in core code 2, *Enhanced MoFA assistance required for farmers.*

## The term 'building capacity in agriculture'.

**Knowledge transfer and profitability as 'building capacity in agriculture'.** This research noted that understandings of the term 'building capacity in agriculture' elicited less commentary from participant farmers than that of the term 'sustainable agriculture'. No particular words emerged in association with this term, and of the understandings that were revealed, 'building capacity in agriculture' was understood to relate to profitability in farming where the acquisition of agricultural knowledge, technology, farming inputs and funding were necessary. Of particular mention by participants in relation to understanding this term was the desire for greater agricultural knowledge, and hence education, as indicated in subcode *2b, 'Building capacity in agriculture' means the acquisition and use of knowledge in agriculture.*

The historical perspective of Maldivian agriculture suggested the presence of generational agricultural knowledge passed down through farming families, with Maloney (1980) commenting on the dissemination of agricultural knowledge from mothers to children [mainly females] as they worked together in cultivating household gardens. Butany (1974) noted that the Department of Agriculture had also provided rudimentary farming information to farmers on topics such as pest management and harvesting methods. However, Butany (1974) added that such information was usually limited in its technical content, and thinly dispersed over such a large distribution of islands. More recent literature from ADB (2005) and IFAD (2006) programme reports alluded to capacity building in agriculture as a process that could propel subsistent farmers to semi subsistence farming. They contended that new knowledge, technical training and the transfer of skills and technology could increase the productive capacity of existing crops and provide a stimulus for trialling new crop varieties for new markets (ibid). A poignant quote that linked the acquisition of agricultural knowledge to building agricultural capacity came from a participant cooperative member:

> An outsider came to the island for two or three months and held classes and showed farmers the best way you can grow crops like watermelon. During his visit, many people became interested in agriculture. Before the outsider came, there was no agriculture programme on this island. This is what building up this agriculture capacity means to me (D#17).

Participants in this research further asserted that the acquisition of agricultural knowledge through schools was of significance in 'building capacity in agriculture'. They contended that if the youth were informed about the potential of agriculture as a business opportunity, they would become actively engaged in the sector. Participants applied blinding logic in concluding this rationale by positing that without youth participation in the agricultural sector, its permanence within the community was at threat.

The main discussion that related to the acquisition of agricultural knowledge appeared in core code 2, *Enhanced government assistance required for farmer.*

**Using both terms together and understanding what they mean.** The terms 'sustainable agriculture' and 'building capacity in agriculture', were not typically included in farmers' vocabulary when discussing their farming experiences. However, of the farmers who did use these terms, few linked them together. For those that did, 'building capacity in agriculture' simply led to 'sustainable agriculture'.

The participant farmers interpretations of the terms 'sustainable agriculture', and 'building capacity in agriculture' shared some similar interpretations of the terms with august institutions such as The Agricultural Sustainability Institute of the University of California, Davis. Researchers at UC Davis suggested that sustainable agricultural capacity would be motivated by profitability, environmentalism, and an equitable distribution of social and economic benefit (University of California Davis, 2017). While the notion of profitability was embedded within the participant farmers' understanding of the terms, the notion of environmentalism, and equitable distribution of social and economic benefit were not generally included as significant considerations according to this research. However, such considerations were of significance to MoFA and its donor partners particularly in accessing donor funding and programme assistance intended for agricultural interventions in the Maldives (IFAD, 2006; IFAD, 2008).

This research has noted differing meanings of the terms 'sustainable agriculture' and 'building capacity in agriculture'. Ultimately this shows that the subject's meaning is open to interpretation. Maybe an accommodation of what the terms mostly mean to farmers would better shape future MoFA interventions directed towards building sustainable agricultural capacity in the Maldives. For example, participants noted that both terms were inextricably linked to the notion of profitability. However, most institutional interventions did not view

profitability as a priority but rather focussed on the raising of island incomes for vulnerable groupings through their inclusion in agricultural activity.

In validating a more context specific interpretation of what building agricultural sustainability means to farmers in the Maldives, perhaps Schaller's (1993) comment provides a way forward:

> The concept of agricultural sustainability does not lend itself to precise definition, partly because it implies a way of thinking as well as of using farming practices, and because the latter cannot be specified as final answers (Schaller, 1993, p.89).

Schaller's proposition that meanings could not be captured but were rather contextually driven would seem an appropriate consideration for MoFA, its donors and the farmers, to adopt in the future planning and implementation of capacity building for sustainable agricultural practices. As a point of note, appreciating the contextually driven thoughts and actions of farmers in this research, became a touchstone for reconciling much of my understanding of the Maldivian farming story.

## 7.5. The key factors encountered by farmers in the Maldives

This section of the chapter examines the analysis from chapter five as presented in core codes 1, 3, 4, and 5. In this section, the key factors are discussed in a sequence that is designed to assist the reader in understanding the unfolding Maldivian farming story.

### Farming is preferred as an individual and family orientated activity that is often assisted by migrant labour – Core code 5.

This section examined the underlying reasons for the preference by participant farmers for individualistic and family farming that was often assisted by migrant labour. Within this examination, the non-preference for farming through more formalised collective structures such as cooperatives also emerged.

**Island life as a basis for individualistic and family farming.** In the Maldives, IFAD (2006) noted that of the two-thirds adult population engaged in agricultural activity in the Maldives, most comprised farming households. IFAD (2017) further noted that Maldivian farmers were traditionally '"very individualistic"' (IFAD, 2017, p.15), and not interested in farming with people they were unfamiliar with. Hence their preference for farming with family members, or in some instances, with small groups of close friends.

A clue to the background for the preference of individualistic farming activity came from Lowenthal (1987) when he described a "managed intimacy" (p.39) prevailing in small island

communities where negative feelings were often masked for the sake of social harmony. Lowenthal's description of 'managed intimacy' resonated with the findings in this research where farmers realised that it was necessary to share common island functions such as transportation to and from factor and producer markets. However, they were reluctant in allowing others to act as financial intermediaries on their behalf. This boiled down to issues of trust. As eloquently noted by a participant farmer/restaurateur: "Farmers do not see how they can work together for money. They will not trust each other with money, and they will not make profit from farming with others" (I#37).

In his commentary on the Maldives, Romero-Frias (1999) alluded to a state of self-containment and contentment on the islands derived from islanders sharing experiences in order to overcome feelings of geographical isolation and remoteness. However, he contended that the sharing of experiences could result in discontent as internal occurrences created feelings of animosity, jealousy and resentment. In this research, it was noted that jealousy and resentment towards farmers with outstanding crop yields could result in malevolent plotting against another farmer manifesting itself as malicious gossip or the vandalism of crops.

Despite the potential for disruptive practice within Maldivian farming communities, participant farmers believed that this could be minimised by pursuing farming as an individualistic activity unhindered by the actions of those they were unfamiliar with.

**The Maldivian family farming unit.** In this research participant farmers noted that agriculture was an enjoyable activity both in producing fresh food for the family table, in selling produce to the market, and as a sociable activity where farmers would gather in the late afternoons to swap stories. A husband and wife farming couple summed up the enjoyment of farming when they noted: "Farming with our friends is an enjoyable pastime. We farm and gossip together in the evenings. We like this" (I#3). This research further noted that farming friends would sometimes join together in small groups to undertake activities such as land clearing and weeding. Despite the friendliness exhibited by some farmers towards their colleagues, a participant farmer and Environmental Club member commented: "It's good when you see couples and groups of friends farming together. They are usually the older ones. But this type of farming is not usual in the Maldives because most farming is by yourself or with other family members" (I#44).

As in many agriculturally based developing countries, women were the main household and field plot farmers in the Maldives (ADB, 2005). IFAD (2017) had noted a UNDP estimation of women comprising 85% of farmers in the Maldives. This research noted that women undertook a variety of cultivation and harvesting tasks mainly on a part-time basis during early mornings and late afternoons. Commenting on the prevalence of women farmers on his island, a participant guesthouse chef noted: "When I go past the fields, I see the women either in groups or alone doing all the work. No sign of the man. The women are doing everything" (I#82). Despite the prominence of women in Maldivian agriculture, IFAD (2017) had noted that little had been done within their PTAFRP programme to promote gender equity in agriculture whereby women would have increased access to assets and resources, would share more of the workload with men, and would exercise greater influence in decision-making.

The presence of men in farming activity was noted by FAO (2012a) where they performed physical tasks such as heavy lifting and land clearing and would assist their wives when the fishing was poor. Men further assumed a management role as interlocutors with markets for the procurement of farming inputs, the marketing of produce, and the management of migrant agricultural labour. The research noted that men occupying management positions in large farms regarded their work as a 'respectable' a full-time occupation managing a farming business. The issue of respectability in farming was discussed in the section, *Stigmatization of farming as a low-class activity* – Core code 3.

**The role of migrant labour in farming.** This research established that much of the individualistic and family orientated farming story of the Maldives was underpinned by migrant labour undertaking most of the manual labouring in cultivation and harvesting. FAO (2012a) commented that the high prevalence of migrant agricultural labour in the Maldives sometimes left women farmers feeling marginalized in their farming activity with nothing left to do. However, this research found little evidence to support the diminishment of women in farming as a result of the high prevalence of migrant agricultural labour; indeed, it appeared that more women engaged in farming knowing they could draw on migrant labour to assist in their activity.

Maldivian participant farmers regarded migrant agricultural labour as generally hard working, reliable, cost effective, but increasingly difficult to source through official channels due to a limitation on foreign labour import quotas. Despite reduced import quotas, the current research observed little evidence supporting a reduction in migrant agricultural

labour. This may have been due to the high prevalence of undocumented migrant labour which Transparency Maldives (2015) noted as being active across all sectors in the Maldivian economy.

In validating the significance of migrant agricultural labour to the Maldivian farming community, the leader of a discussion with eight participant farmers noted:

> The labourers usually work a twelve-hour day from 6 a.m. to 6 p.m. They are obedient in following instructions, and only become excitable if they are fighting with each other. We give the instructions in the morning, and then we go to the fields in the evenings and discuss the day's work with them. We cannot get Maldivians to do the same work, especially at the cheaper rates. Bangladeshi's are more suitable for farm work than Maldivians, and they are cheaper (D#8).

Participants in this research frequently referred to the increasing role Bangladeshi labour was playing in the agricultural sector as it became involved in more aspects of the agricultural supply chain. Participants noted that Bangladeshi workers were renting their own field plots on islands to grow produce which was transported to the Male' market by Bangladeshi boat crews. The produce was then sold in market stalls rented by Bangladeshi traders. The research noted although much of the Bangladeshi participation in the agricultural sector was undertaken through nominee Maldivian nationals, MoFA were aware of the considerable contribution the Bangladeshi community had made to Maldivian agriculture. As noted by a participant MoFA official: "Bangladeshi's deserve their money because they work hard, and they keep local farming going on. Without them there would not be half of this farming activity" (I#120). However, MoFA added that the undocumented Bangladeshi labour immersion within the agricultural sector raised concerns over poor farming practices particularly in the use of hazardous pesticides. They posited that this needed to be monitored but as to how was unclear.

**An aversion to collective farming structures such as cooperatives.** IFAD (2010), in its *Rural Poverty Report 2011,* commented on the importance of farming households intersecting with collective farming structures, such as cooperatives and farmer's associations, in order to access farming inputs, skills training, and markets for the sale of produce. The 2004 FAO report, *FAO and SIDS: Challenges and Emerging Issues in Agriculture Forestry and Fisheries,* posited that collective farming structures created social cohesion, blended traditional agricultural knowledge with modern farming practices, and so benefitted sustainability efforts in agriculture. On commenting upon Maldivian agriculture, Ellis[47] in Maloney (1980)

[47] Ellis, R. H. *A short account of the Laccadive Islands and Minicoy,* Madras Government Press, 1924.

noted the “cooperative principles” (p.180) of sharing farming duties amongst friends, and Butany (1974) described the presence of cooperative stores for the sale of fish and purchase of household items on many Maldivian islands.

Despite reference to ‘cooperative principals’ in Maldivian farming, the current research observed that there was little appetite for their inclusion beyond naturally occurring friendships. Even less appetite was observed for ‘cooperative principals’ to be enshrined within formalized production and marketing structures such as cooperatives. Indeed, as noted IFAD (2017): “There are “no indigenous roots” for such cooperative organizations in Maldives … Maldivians were "very individualistic" and were "not interested in “cooperatives"” (IFAD, 2017, p. 15). Validating this observation were a group of four Bangladeshi agricultural labourers, one of which noted: “We know about farming cooperatives from our country, Bangladesh. Maldivians do not like cooperatives. Sharing work with others is not in their minds. They like to be separate and not together for farming work” (D#14).

In commenting upon the lack of cooperative success that was evident to many farmers in the Maldives, a participant President of an atoll council noted: “The main reasons why cooperatives are not working well at the moment is because none of the farmers have seen any benefit from them, so what’s is the point in having them?” (I#59). Participant farmers in this research noted that cooperatives would be more acceptable to Maldivian farmers if they helped farmers get cheaper inputs and assisted in selling farmers’ produce to the markets. Participants added that cooperatives were instead associated with implementation delays, where MoFA and the cooperative membership often had differing ideas about how cooperatives should function.

As previously mentioned, a further association with cooperatives by participant farmers concerned mistrust in the handling of money. Many participant farmers noted their unease with cooperative committees and administrative staff acting as financial intermediaries, particularly in the remittance of funds to farmers from the sales of produce. Participant farmers cited delays in receiving payments, and in some cases believed that farmers money had been misappropriated. A participant NGO manager summed up this concern when he noted: “Farming has to be based on real trust that you get in a family. You do not get this level of trust in a cooperative with people you do not know well” (I#98). In noting a final comment on the cooperative presence on some islands, a participant NGO manager

concluded: “Cooperatives were established to promote cooperative values, but for cooperatives to work, people have to cooperate, and this did not always happen (I#98).

**Political capture.** Joshi et al. (2017), noted that cultural norms predicated on hierarchy were commonplace in many parts of Asia, particularly in India where ‘scheduled’ castes ensured segregated living and work opportunities, mainly as a result of entrenched client patron relationships. In the Maldives, Maloney (1980) observed a hierarchical caste structure that was controlled by a strict political core: “Social and political control is rigid at all levels” (p.175). Maloney further observed that this type of hierarchy was expected by the people due to its historical immersion within Maldivian culture. However, in the seventies, the rigidity of the control appeared to be defused, as a class structure emerged based upon education, wealth, and exposure to experiences from the outside world. As Maloney (1980) noted, even the use of the English language could be a powerful tool in distinguishing class demarcation.

In the case of Maldivian agriculture, this research noted that hierarchical actors within island communities such as Island Office officials or wealthy trading families could exercise influence over where island produce was sold. A participant ex island councillor freely admitted that he controlled the sale of produce from his island to other islands where he had a network of selling agents. He added that he had established this business when he was in office.

This research also found that some farmers viewed the establishment of MoFA led cooperatives with their accompanying funding and equipment packages as an attempt to extend political patronage. In such circumstances, participant farmers were not outwardly critical of the formation of the cooperatives, but rather chose to register their scepticism by not joining them as members. More outspoken criticism of GoM involvement in agricultural ventures came from private sector partners who were supposed to join the FADiP programme in a joint venture company with the GoM and farmers, but instead desisted in the belief that government would exert undue influence. As noted by participant commercial farmer: “We would never be partners with the Government whoever is in power. We can do work for the Government, but we do not want to go further and be with them in a company otherwise there will be many problems for us” (I#102).

## Profitability motivates people to enter the food sector – Core code 4.

Section 7.3.1. of this chapter*, what do farmers in the Maldives understand by the terms 'sustainable agriculture', and 'building capacity in agriculture',* referred to profitability in farming as being the most common association with these terms. In this core code, commentary relating to profitability was largely devoid of reference to either of the terms.

**If not for profit, for what?** It was the view of most participant farmers in this research that there was little point in pursuing the activity of farming if it were not profitable. Underpinning this view was the farmers' reluctance to expend financial resources and work effort in order to breakeven or incur a loss on their farming activity.

In conveying the understanding of profitability, the terms 'making money' and 'getting a better income' were commonly used. The level of profitability was denoted by use of such words as 'less', 'little', 'low', 'more', 'big', and, 'high'. A frequent participant description of profitability would include the phrase: 'big, and more profit'. In reflecting on the significance of profitability to participant farmers, one farmer noted: "Farming is not for a hobby, not for anything else, but just for making money and profit" (D#10). Four participant Bangladeshi labourers confirmed the significance of profitability to their farming ventures when one labourer noted: "Farming is profitable for us on this island. We cannot get such a good opportunity in Bangladesh. We can make more money here" (D#14). The unprofitability of farming was commented upon in core code 3 of this section*, Stigmatization of farming as a low-class activity*, where it was noted as a disincentive to engaging in farming.

**Recording profitability.** Most participant farmers confirmed they kept records of expenses covering farming inputs, transportation, labour, loans, and so forth, and records of income. MoFA (2010) were less convinced by the farmers' assertions that accurate record keeping was adhered to and referred to a lack of accurate data entry in clouding the status of farm profitability. However, they noted that financial records would normally be required for institutional loans to farmers, although this research noted that such loans were negligible indicating a lack of agricultural funding capacity. However, MoFA (2010) did note that personal loans between family and friends were sometimes undertaken for farming activity and, were essentially based on trust rather than reference to the farmer's record keeping of the farms financial status.

Cooperatives were vaguer in their commentary on record keeping and noted that there were often problems with accounting software and data entry, which confused their

profit/loss calculations. IFAD (2013) noted that data entry could be sporadic and were sceptical of any claims regarding cooperative profitability. This somewhat grey area in the accuracy of record keeping amongst farmers and cooperatives appeared to add momentum to the perception that farming was a marginal activity since reason to the contrary appeared unencumbered by evidence. In short, the financial sustainability of the agricultural sector was unclear.

This research noted that record keeping amongst participant agro dealers supplying farmers with farming inputs, and commercial food distributors supplying resorts with produce, appeared to be precise, and clearly indicated their profitable status. Both groups of participants reiterated a previous comment from participant farmers that they would not engage in such businesses if they were not profitable. Of the few commercial farmers in the Maldives, those interviewed in this research noted their adherence to accurate record keeping but were noncommittal about their level of profitability. The reason for such noncommittal remained unclear.

**Profitability would encourage youth participation in farming.** Profitability in farming was commented upon by participants as being a key motivator in encouraging youth to engage in agriculture. As noted by a participant cooperative treasurer: “If the youth know that farming can be profitable for them, and they can survive and feed their families, they will stay on their islands and do farming” (I#70). An outlier comment made by a participant deputy school principal noted that students often did not realise how profitable farming could be. She further implied nor did the teachers:

> At the school we have workshops, which explain different jobs students can do when they leave school, and we had someone explain how profitable farming could be. None of the students realised this. They had not even thought about farming as a job. But they listened to this man because he said the income from farming was good, and higher than teachers’ salaries. In fact, we all listened hard (I#61).

The youth attraction to profit in farming was evidenced by three young farmers from a large agricultural island who noted that they had all left their previous salaried jobs and taken up farming because: “Farming makes a good income for us" (I#54). Accompanying this sentiment, youth posited that profit would be generated by the introduction of technology into farming operations. Specifically, many youth participants in this research felt that the introduction of greenhouses utilising hydroponic systems would lead to a cleaner and profitable type of farming, as opposed to the traditional youth perception of hard and dirty

toil in the fields for little financial reward. Youth participation in farming was further discussed in core code 3, *Stigmatisation of farming as a low-class activity.*

**Trust and risk.** This research revealed that participant farmers believed trust in handling money was essential to profitability. Trust was explicitly linked to family farming units where family members were trusted to transact money in purchasing farming inputs and selling produce. In this scenario, participants believed that money would not be misappropriated and families could reap the profit of their efforts. Participant farmers mistrust appeared rooted in financial intermediaries such as cooperative committee members where payments to farmers could be delayed, or nepotistic preference given in purchasing produce at favourable prices from certain farmers. Participant farmers contended that such action undermined their profitability as their produce could be purchased at a lower rate by the cooperatives, or not purchased at all. Further mistrust was directed towards some food traders in paying deflated prices for produce to farmers, and then selling at considerably higher prices in the Male' market. Again, participant farmers contended that this undermined their financial sustainability.

Pearson et al (1995) commented upon the notion of risk when he noted that farmers in the developing world "Wish to earn as much as possible with least effort and risk" (p.3). Participant farmers in this research echoed this sentiment noting that their considerable time, effort, and investment in farming was subject to risk from poor sale prices, and inclement weather and pest intrusion damaging crops that would have otherwise generated profit. In articulating their consideration of risk, participant farmers commonly referred to 'risky' farming, a term repeated by institutional lenders who defended their reluctance to lend to the agricultural sector citing its 'risky' nature.

**Commercial agriculture.** Commercial agriculture in the Maldives was largely an indeterminable presence due to the lack of information concerning its operation, and thus profitability.

Islands leased for agriculture were typically taken by established businessmen who undertook to invest in technical resources to develop intensive farming ventures. Such ventures usually comprised greenhouses with hydroponic feeding systems for the production of salad and soft fruit products. The commercial farming ventures were invariably cross subsidised in their operation, particularly concerning transportation, with other businesses operated by the lessees such as resorts and food trading businesses.

MoFA and this research assumed the output of commercial agriculture to be small in comparison to that of farmers on inhabited islands, and by the fact the an estimated 90% of food consumed in the Maldives continued to be imported. Further fuelling this assumption was the lack of unsubstantiated data relating to production and marketing functions.

Of the commercial agricultural islands visited in this research, investment in infrastructure, plant and equipment was variable, as was the level of technical competence in management and general staffing. Whilst there was evidence of investment capacity in infrastructure and plant, the presence of knowledge capacity appeared limited to a few key individuals usually of non-Maldivian origin. The financial sustainability of the commercial farming operations, and thus, the profitability was unknown.

## Stigmatization of agriculture as a low-class activity – Core code 3.

**The diminishing respectability of farming.** Early commentators on Maldivian agriculture such as Bell (1883) noted the primacy of fishing and the high regard for agriculture in contributing to the survival of island communities in days of old. Present day commentary from a few youth participants in this research further noted the dignified status attached to Maldivian farmers fifty years ago as producers of food for island communities. Butany (1974) noted that while fishing was easier and generated almost immediate financial returns: “Agriculture, however, takes precedence over fishing in certain islands where crop cultivation is more profitable” (p.7). Agriculture’s parity with fishing in terms of island status was then evident.

However, during the late seventies and eighties, the perception of sociocultural and economic parity between fishing and agriculture shifted as financial returns from mechanised fishing fleets far outstripped those of subsistence farming. The advent of luxury tourism and increased transport connectivity also saw a surge in food imports serving all sectors of the Maldivian population. Hence, the perception of agriculture began to shift from a respectable and dignified activity providing food for island communities, to one that became a pastime undertaken by retirees, low income families, and migrant agricultural labour. Commenting of the exiguity of agriculture and the primacy of fishing, Maloney (1980), in his book, *People of the Maldive Islands,* observed: “Farming is not usually a full-time occupation, nor is it as respectable as fishing” (p. 287). He further noted that farming could be done by anyone, more commonly women, and was usually a stopgap during times of lean fishing or undertaken by those who were not good at fishing. In continuing to

observe the primacy of fishing in Maldivian society, Maloney (1980) added that: "Fish is the most important product of the Maldives, and fishing is what Divehi's [Maldivians] do best" (p.25). He again alluded to fishing as a "respectable" (p.16) activity that was embedded within most aspects of Maldivian life.

Recognising the diminishing status of Maldivian agriculture, the GoM articulated strategies at building sustainable capacity into agricultural practices in a series of national development plans. Indeed, *The Strategic Action Plan 2009-2013 (2009)* explicitly articulated the perception of traditional farming as a low-class activity that had to be de-stigmatised in order to encourage investment and youth participation in its activity.

**Community and youth stigmatisation of agriculture as a low-class activity.** This research noted that much of the stigmatisation of agriculture appeared to be rooted in the absence of youth from its activity. As noted by one participant farmer, there would be no greater validation of farming in the Maldives than to have its youth as active participants (O#45). Within the phenomenon of youth absence from agriculture, the research revealed two contributory factors: (i) community and parental stigmatisation of agriculture, and, (ii) paucity of agricultural learning in schools.

In terms of community and parental stigmatisation of agriculture, this research noted that communities in general, and parents in particular, appeared to condition their children into thinking that farming was hot and dirty work, undertaken by uneducated youths for which there were few other job opportunities. The elderly and migrant labour were further identified as being associated with agriculture both as a retirement activity, and as paid manual labouring respectively. Community stigmatisation of agriculture then appeared to centre on the perception that it was a low-class activity of little appeal to the professional aspiration of youth. Commentary from a participant school headmistress summed up the possible origin of this stigma when she noted:

> It [farming] used to be a good thing to do, but I know that we feel farming is a low-class thing in this country now. Maybe it goes back to some of our literature where we thought farmers were the lowest order because their work involved manual labour in the fields. For example, our literature often mentions the role of toddy collectors referring to them, their sons, and families as low caste (I#113).

This research observed that parental stigmatisation was rooted in parents' preference for children to use their education to get a clean, well paid job in an office or in the tourist sector, rather than one that was associated with hot and dirty manual labouring in the fields. Much of this sentiment appeared to be based upon parents' own upbringing where

they did not want their children to endure the hardships of farming as they had. As noted by a past agricultural trader participant who was also a parent: “Farming is a low standby job. Young people with good education will look for opportunities in tourism not farming.” (I#46). A participant student commenting on the parental view of farming also noted: “Our parents will say to us that we have to do ‘behind the desk stuff’ for our jobs, and not this farming” (D#11).

The research noted that much of the perception of farming as lowly paid, hard and dirty work, was derived from its association with the migrant labour that undertook the majority of agricultural labouring. This perception was reinforced by the visual image of the labourers poor living conditions which often comprised makeshift shacks on the edge of the fields they were cultivating. Commenting upon this observation, a participant head teacher/parent noted: “Our kids see how hard these labourers work, and how poor they are living in the fields. The kids think there is no way I want to do any work like this, and this is what the parents think as well” (I#41). In a discussion with four participant youth, they noted that they would be more interested in farming if they could assume a supervisory role over foreign labour. One of the youth noted: “We can get some labour from Bangladesh and tell them how to do the farming. They can do the hard work, and we will organise. We will pay them good rates and give them food and accommodation” (D#13).

**Lack of agricultural learning in schools.** Contributing to the youth stigmatization of farming was the lack of agricultural learning in schools. Unlike fisheries science, which was a dedicated subject taught within the curriculum, only aspects of agriculture such as botany or environmental protection tended to be included within subjects such as environmental science. In the few instances that this research found practical agricultural learning as an extra curricula activity in school plots, staff admitted that their knowledge of plant cultivation was scant, and mainly confined to telling students about regular watering and weeding. With general community and parental stigmatisation of agriculture apparent, the next section examined the youth view of agriculture.

**Youth and agriculture.** Youth participants in this research observed that youth preferred to gravitate towards the tourist sector, the civil service, and island council offices for employment. Within this observation, they also observed that young men preferred fishing to agriculture, and women who were not employed in either tourism or the civil service, preferred to tend to families where they also undertook farming in household gardens and small field plots. Confirming the allure of tourism for youth employment, participant Island

Council officials from one island observed that 80% of the youth had secured well paid employment on neighbouring tourist resorts. They added that an added attraction of tourist sector employment related to status where a close association with western lifestyle was desired.

In recounting the hierarchy of desirable youth employment, one male youth participant noted:

> If we boys are clever, we will do a job inside the office where it is a cool temperature, and the work is not too hard. If we are not that clever, maybe we will go on the fishing boats or mostly go to be a room boy at the resorts. Farming is not for us. We do not want to work in the fields getting hot and dirty. This is the job for workers from Bangladesh or India (I#33).

**Poor work ethic exhibited by some Maldivian men towards farming.** Reference to the industrious agricultural effort of women and migrant labour was previously referred to in this chapter. In contrast, this research noted a repeated reference to the poor work ethic of some Maldivian men in farming. As noted by a participant agro dealer:

> Honestly, I have to say even though I am a Maldivian man, the reason they [Bangladeshi's] are so strong is because we are lazy. We men will not do the farming or selling work in the market, but instead we just sit in a café drinking coffee and talking about doing work. This is the truth (I#101).

Maloney (1980) had also observed some unwillingness to undertake farm work by men in farming households, while Bell (1883) noted a constitutional laziness that enveloped much of the Maldives. A participant expatriate doctor in this research rather diplomatically described the male reluctance to engage in agricultural labour as being due to the 'restful nature' of some islanders! In commenting upon such restful nature, a female participant farmer confirmed the poor work ethic of Maldivian men in farming, and proudly announced that this was one of the reasons that had led her to marry a Bangladeshi labourer working on her fields…because he was a very hard worker!

Discussion within the research on the reluctance by some Maldivian men to engage in farming appeared to relate to the combination of hard work set against unknown financial gain. It was noted that many Maldivian male participants did not object to hard work if they were certain of the financial gain such as generated by salaried employment in container handling at the Male' harbour, or baggage handling at the Male' airport. However, many Maldivian male participants were aware that deriving a financial gain from agriculture could not always be guaranteed. Indeed, they were aware that crops took time to grow and then be sold at the market, during which they could be damaged by floods or pests. This research

then noted that income instability from agriculture was often contrasted with the relative income stability provided by salaried employment.

**The stigmatisation of fresh food in favour of processed tastier food.** A further link to the stigmatisation of agriculture was found in the youth preference for processed food rather than locally produced fresh fruit and vegetables. Participant youth in this research noted a general dislike for the taste of fresh fruit and vegetables, preferring 'tastier' processed food comprising salty snacks, sugary soft drinks, poultry meat, and starch based foods such as pasta and pizza. This was evidenced in restaurants frequented by youth where there was a lack of traditional fish curry and rice on the menus in favour of pizza and fried chicken pieces. Participant youth noted that the tastier processed food was a welcome change from the traditional fare of rice and fish curry that was often served in the home. Many participant parents in this research confirmed the youth preference for processed food and noted that far from the traditional rice and fish curry being served in the home, children often demanded tastier processed food instead.

In addition to taste, processed food was further associated with greater affordability and availability than locally produced food. This was evidenced in the research by its dominance in most of the island shops visited during the fieldwork. In many ways, processed food was then regarded by Maldivians as a more sustainable food source than locally grown produce. Participant shopkeepers further noted that a preference for processed food was sometimes expressed by customers for health reasons where it was believed that food preservatives would prevent the formation of harmful bacteria forming in the hot and humid conditions existent in the Maldives. This was in contrast to fresh produce that without the benefit of refrigeration decomposed rapidly in hot and humid conditions.

## Poor market connectivity - Core code 1.

According to this research, poor market connectivity was a multifaceted challenge that hindered the building of sustainable capacity in agricultural practices for many Maldivian farmers. Participants noted that the core of this challenge was their frequent inability to sell produce for the price they wanted in local markets. To a lesser extent, participants noted expensive factor markets with limited stocks as further contributing to poor market connectivity.

The breadth of this core code made it the largest of the core codes in terms of numbers of participants contributing to a topic (No. of participants: 818, no. of references: 1476).

**The relevance of markets for farmers.** IFAD (2010) in its *Rural Poverty Report 2011* observed that many smallholders in the developing world regarded markets as significant in enabling them to translate farming effort into financial gain. Nowhere was this observation more evident than in the Maldives where farmers regularly cited poor market connectivity as their default reasoning for many of their other farming woes.

Commenting on the paucity of Maldivian agricultural markets for local production, Maloney (1980) observed: "Of great significance is the absence of any marketing system for produce…" (p. 289). He continued to argue that an institutional response was required to address this shortfall, although he was not forthcoming in detailing the nature of this response. Maloney (1980) further noted that the Maldives did not even have a bartering system where produce surpluses and shortages could be exchanged. In terms of markets for imported farming inputs and food produce, ADB (2005) contended that the Maldives was similarly framed within the context of agricultural markets in many SIDS where their narrow range was impacted upon by such externalities as infrequent and expensive transportation, and global commodity price spikes. While this may have been the case up until the eighties, this research noted that the proliferation of high end tourism and transport connectivity both domestically and internationally had resulted in highly competitive and frequent food flows into the Maldives from neighbouring countries and further afield. This situation remains today with an estimated 90% of the national food requirement being imported (IFAD, 2017).

Participants' commentary on markets was convoluted and confusing at times, however, this research noted the emergence of five main points contributing to the participants' unhappiness with local markets. These included: (i) unfair competition from farmers in other countries where lower production costs were achievable, (ii) high domestic transportation costs within the Maldives (iii) failure by government to reduce food imports through the imposition of import tariffs and/or quotas on food imports, (vi) scepticism from food traders and resort customers over the lack of local production capacity, and (v) the alleged rapacity of agro dealers and market traders in trading produce and farming inputs. These points are now discussed.

**Unfair competition from lower foreign production costs.** Briguglio (1995) contended that economies of scale in production were difficult to achieve in SIDS as fixed costs such as those for infrastructure and training could not be sufficiently defused within SIDS' inherently small markets. Becker (2012) added that the isolation of SIDS magnified the import costs for

farming inputs, which resulted in diseconomies of scale in production, leading to higher selling prices as local farmers attempted to recover production costs. The majority of participant farmers in this research agreed these positions as they argued that they were unable to compete with the lower production costs achieved by farmers supplying food to the Maldives from larger foreign countries. In illustrating this point, participant farmers noted their belief, and in some cases their experience, that lower production costs could be achieved by Sri Lankan, Indian, and Thai producers, where inexpensive labour and farm inputs such as seed, fertilisers, and equipment were readily available. Some participants further noted that lower production costs enabled economies of scale and efficiencies in production to be achieved resulting in cheaper pricing to the consumer. Commenting on this predicament and its impact upon the thinking of many farmers, a participant cooperative member noted:

> We cannot compete with this imported food as we have to pay customs duty and boat charges for our fertilisers and chemicals to get it to our island. We have to spend more money to grow this food than these outside farmers do. It is easier just to import the food than trying to grow it here (D#17).

This research was unable to validate the participant farmers' claims of lower production costs in countries supplying food to the Maldives. However, conversations I had with Sri Lankan farmers discussing farming input accessibility revealed that farming inputs in Sri Lanka were more available and affordable than those in the Maldives.

**Transportation costs.** Exploring the issue of transportation in SIDS, Becker (2012) referred to the "tyranny of distance" (p.1) in his discussion on the connectivity of Pacific SIDS, where geographic isolation virtually ensured expensive and comparatively infrequent transportation links with the outside world. However, in the Maldives its location on the main shipping highway connecting the Gulf states to south east Asia and beyond, ensured a regular and competitively priced flow of containerised sea freight with accompanying feeder services to southern India, Sri Lanka and the Maldives. In this research, participants concern focussed more on domestic inter island and inter atoll sea freight transportation linking producer islands to the main food trading market in Male'. A participant cooperative manager highlighted the significance of transportation when she noted: "Everything is down to transportation in the Maldives. Everybody's issue is transportation. If it doesn't work properly, nor do we" (I#123).

In their discussion on agricultural challenges facing SIDS, FAO (2004) asserted that as farming inputs were typically required in small quantities, they either incurred higher unit

costs in transportation, or high storage costs for bulk purchases. This research noted both scenarios applied to the Maldives where participants often complained about the high cost and or limited availability of chemical fertilisers and pesticides. The transportation of produce both from producer islands to Male' and from Male' [with the onward distribution of imported and local produce] to islands was a further area of concern for some participants who cited infrequent ferry services connecting islands, and or greater transportation expense than international sea freight between southern India and Male'.

Despite the reference by some participant farmers to expensive and infrequent domestic sea transportation connecting them to the Male' market, this research found relatively frequent and inexpensive inter island and inter atoll ferry services between regional hubs and Male'. This research also noted good transportation links between smaller islands that were located close to Male' where government and private ferries operated. However, it was noted that islands located further from Male' and away from the main regional hubs did experience infrequent and more expensive transportation charges in transporting their produce to the Male' market.

In terms of transportation cost, this research found that small amounts of food cargo often travelled free of charge or at a nominal fee on passenger ferry services between the islands and to Male'. Where greater quantities of produce were transported on a regular basis cargo fees tended to reflect a more commercialised rate.

**Import tariffs and quotas to reduce food imports and boost local production.** This research found that there was a common perception in the minds of many participant farmers that a reduction in food imports would stimulate local food production. In the majority of cases, participant farmers predicated this perception on sufficient local productive capacity being available to replace imported food in terms of quantity, quality, variety, pricing, packaging, continuity of supply and, client service levels. Farmers were, however, minded that such capacity would take time to build before it became sustainable, and were further minded that whilst they could increase the variety of produce to include new items, it was unlikely that they could replicate the provision of some meat and dairy products.

The research noted that the participants' perception of boosting local productive capacity by reducing food imports could be assisted in its implementation by the introduction of tariffs and quotas on food imports. Participants believed that customers would then prefer inexpensive locally produced food items compared to more expensive imported food items.

Comment in an interview by one of three participant cooperative committee members noted:

> There should be a limit on what food is imported especially if it can be grown here. I know they have import duties on some fruits that are grown here, but we must also have the quota to stop too much coming in, then our production will run smoothly in this country (I#19).

Becker (2012) posited that SIDS had little opportunity to contemplate import substitution due to the limited agricultural output of small populations. Worrell (1992) concurred and added that the desire to substitute imported food with greater domestic production could not typically be met by the local agricultural capacity without sufficient scaling up taking place. Briguglio (1995) added that inflated pricing and substandard quality of locally produced goods could result from an import substitution policy where production capacity deficits were evident. He continued that this could also result in the emergence of parallel markets for imported goods. Within this thinking, MoFA (2012a) agreed that there was insufficient local capacity to substitute imported food with local produce. Participant food traders added that whilst farmers and food traders may be short term winners as a result of import substitution policies, higher prices would almost certainly result for the consumer.

**Scepticism over local production capacity by food traders and resort customers.**

Participant commercial food distributors and resort operators were sceptical over claims by participant farmers that import substitution strategies could considerably reduce the reliance upon food imports. The scepticism was founded on two assumptions: (i) local producers would not be able to provide the same level of ease and reliability as foreign food suppliers, and (ii) resource constraints would prevent the necessary local commercialisation of agriculture needed to compete with food imports.

In code 8, *Farmers have difficulty in connecting with the market in order to sell their produce*, participant food trades and resort operators noted the ease and reliability of procuring large quantities of food items from external food suppliers. The products were noted as being of good quality, comprehensive variety, competitively priced, and regularly supplied to the Maldives. Participants further noted that while local producers could sometimes compete in quality and pricing on niche items such as papaya and sweet melons, the continuity of supply was poor. They posited that this often resulted in sudden shortages with emergency supplies having to be sourced elsewhere. As noted by a participant commercial food trader:

> We have tried so hard in the past to deal with farmers. It usually starts OK, but then falls apart because they cannot deliver the quantities we want, when we want. If we stop dealing with the farmers they can make trouble for us complaining to the Ministry that we are not supporting them. Honestly, it is easier not to deal with local farmers, and better to get the imports (I#110).

In confirming the significance of the ease and reliability relationship accompanying external food supply, a participant chef resort noted:

> If you order 50 KGS of mango from Thailand you will get it. Even if the Thai supplier does not have mangoes in stock he will find them for you. He will never say we cannot supply them. You cannot get this level of service with local farmers. It is not their fault, they are just not ready for this type of supplying yet (I#136).

Deficits in entrepreneurial capacity amongst local farmers were cited by participant food distributors in this research as being a barrier to commercialising agricultural output to a level that would reduce food imports. Participant food distributors posited that such a deficit was in part due to the preference of farmers to remain at a subsistent and semi subsistent level thus avoiding the rigours of increasing production and expanding into new markets. However, this research also noted that many participant farmers were confined to subsistence farming due to a lack of resources rather than an expression of preference.

In addition to deficits in entrepreneurial capacity, participant food distributors commented upon the physically challenging environment for agriculture with fertile land and freshwater reserves in short supply. In addressing this situation, participant food distributors posited that farmers should desist from the conventional field plot farming of low value crops and focus on greenhouse cultivation for higher value niche crops such as lettuce. Participants further suggested that in view of the natural resource deficits existent in Maldivian agriculture, agriculture could be offshored to neighbouring countries such as India and Sri Lanka where ample land, water, labour and farming inputs resided. They contended that a dedicated food stock could be produced in these countries for the Maldivian market.

**The activity of traders.** The current research found that agro dealers trading in farming inputs, and market traders trading in food produce occupied a conflicted role within the Maldivian farming diaspora. Whilst providing a valuable linkage between farmers and markets, their activity often attracted criticism concerning the price manipulation of commodities to the detriment of farmers' incomes so many participant farmers believed.

Agro dealers. Agro dealers mainly imported and distributed farming inputs such as pesticides, fertilisers, and equipment, to farmers around the Maldives. They were largely situated in Male' where most farmers sourced inputs to take back to their island farms. On

some of the larger inhabited agricultural islands, agro dealers appointed island agents to conduct sales and provide rudimentary advice on product usage for local farmers. FAO (2004) had previously commented on the price challenges associated with the importation of farming inputs for SIDS where either small quantities or bulk storage increased input costs. In the Maldives, this situation was exacerbated by US Dollar shortages to fund the importation of US Dollar denominated inputs; sales of inputs were denominated in Maldivian Rufiyaa, hence there was no chance for the agro dealer to recover the US Dollars at the point of sale.

Criticism of agro dealers in the Maldives came from participant farmers in two areas: (i) agro dealers manipulated the flow of inputs to the market thus keeping prices high, and (ii) the technical advice on product usage was sometimes inaccurate. This research found no evidence of the first criticism with details of alleged price manipulation unavailable. The research noted that unless a cartel of agro dealers had evolved in the Male' market, the proliferation of Male' based agro dealers would suggest competitive pricing and service levels were present. In terms of input availability, the research noted that there were shortages of some farming inputs on islands visited during the fieldwork, however, the shortages were typically short term with stocks being replenished within three to four days. Some of the participant agro dealers interviewed noted that they made very little money from supplying inputs to farmers and were further weary of criticism levelled at them. One agro dealer noted: "When we have the stocks, farmers don't buy, then when its gone they want it and complain…if the farmers want to bring the inputs themselves, they are welcome to do it then they will see how expensive and difficult it is" (I#108).

Market traders. Participant farmers in this research noted that market traders expertly regulated the flow and pricing of food in the main Male' market through food imports. The rapidity and ease with which food imports could be ordered by traders and delivered into the market could result in high margins for traders where local production shortages were filled at short notice by food imports. At the island level, some participant farmers agreed to take a percentage of the market selling price obtained by the trader for their produce. However, participant farmers were suspicious that traders would not always reveal the true selling price they obtained in the market and then short change the farmers. While this level of suspicion was not always directed towards traders as noted in the case of the trusted boat captain in subcode 8c, *low market pricing*, farmers appeared to believe that traders in general were able to accumulate considerable wealth at the expense of subsistent farmers.

MoFA and IFAD (IFAD, 2008) believed that farmers' suspicion concerning market traders' activity could be minimised through the introduction of cooperatives where the opportunity for price manipulation could be reduced. MoFA posited that cooperatives were in a stronger position than individual farmers to negotiate favourable and transparent pricing with markets; it was this rationale that contributed to the motivation for the MoFA/IFAD PTAFRP and FADiP interventions. However, it was some participants' view that the introduction of cooperatives merely transferred manipulative practice from traders to newly elected cooperative committee members.

## 7.6. Measures that farmers in the Maldives believed would build their agricultural capacity through sustainable means

This section of the chapter examined the analysis from chapter six as presented in core code 2, *Enhanced MoFA assistance required for farmers.* In this section, participant farmers revealed four key factors that they believed would build their agricultural capacity through sustainable means:

- The acquisition of greater agricultural knowledge
- Improved regulatory support for agriculture
- Improved incentives to invest in agriculture
- Improved accessibility to farming technology and infrastructure.

**The acquisition of greater agricultural knowledge.** This research revealed that participant farmers believed increased agricultural knowledge would benefit four main areas: (i) chemical pesticide and fertiliser usage, (ii) youth participation in agriculture, (iii) filling knowledge gaps relating to specific farming challenges, and, (iv) linking changing weather patterns to climate change. Discussion of these areas follows.

Chemical pesticide and fertiliser usage. The lack of knowledge surrounding the correct use of chemical pesticides and synthetic fertilisers in farming was of repeated concern to participants throughout this research. Concern focussed on the potential harming effects to human health from food containing chemical residue from agricultural usage, and on environmental degradation where chemical residue polluted water and soil resources. Many participant farmers in this research noted that they were simply unaware of the correct application, dosage, handling, and storage procedures for the pesticides and fertilisers they used on their farms. However, the participants were aware that such knowledge gaps could

reduce the products efficacy in treating particular pests or nutrient deficiencies, and/or damage crops and human health through over usage. MoFA participants noted that the latter concern extended especially to Bangladeshi labour applying the chemicals in a random manner, and often without protective clothing and face masks. Of further concern to participant farmers was their unwitting use of chemicals that were banned in other countries. In many instances, foreign language labelling masked the identifying details of such banned chemicals. Whilst regulation banned the importation of harmful chemicals, there existed only limited enforcement capacity characterised by unqualified technicians.

In attempting to mitigate the harmful effects of chemical pollutants applied in agriculture, some participant island councillors insisted that field plots were located away from residential areas thus minimising chemical air drift. Whilst this demonstrated an awareness of potential hazards to human health and the environment, the overuse of chemical pesticides continued largely unchecked.

In this research, the level of concern surrounding the overuse of pesticides was not matched by the same level of concern in the over use of synthetic fertilisers. The view of participant farmers mainly noted that if they were over fertilising, the harmful effects would be locked away in the soil and, therefore, broken down over time. This, they contended, would pose a milder environmental hazard than chemical sprays. Despite this view, there were a few participant farmers who raised concern about the long-term polluting effects of nitrogen rich fertilisers on soil and water resources, particularly in view of the visible algal growth on reefs and in reef waters.

Organic heat-treated fertiliser imported into the Maldives attracted little concern as it was viewed as environmentally stable. However, MoFA noted some concern over the large quantities of untreated cattle dung that acted as a vector in the transmission of harmful pathogens and invasive species. MoFA contended that if farmers knew the heightened bio security risks this manure posed, they may reconsider its use, although they also conceded that its low cost and ready availability made it an attractive fertiliser option for farmers.

Most participants in the research believed it was the responsibility of MoFA to educate farmers on the use of approved pesticides and fertilisers for use on their farms. Education was seen as occurring through the forms of training and public messaging where the environmental benefits and hazardous public health impacts of chemicals used in agriculture could be examined. Participants also made it abundantly clear that regulation

needed to be enforced in controlling the importation of harmful pesticides and fertilisers. Regulation of agricultural chemical imports is discussed in this section under, *Improved regulatory support for agriculture*.

Increased youth participation in agriculture. The link between instituting agricultural learning in schools in the hope of encouraging youth participation in agriculture was explicitly articulated throughout this research by participant teachers. However, other participants who advocated agricultural learning such as parents appeared unwilling for their children to engage in agricultural employment as a future occupation. Addressing this juxtaposition, participant schoolteachers noted that if agriculture became a 'cleaner' hi-tech activity that was more business orientated, the stigmatised view of its low-class status may be altered in the eyes of parents and their children to a point where its consideration as a future occupation would be contemplated.

Filling knowledge gaps relating to specific farming challenges. Participant farmers articulated an almost uniform voice in calling for MoFA to provide more targeted agricultural knowledge based upon the specific challenges they were encountering. This was as opposed to the generic farming information that whilst useful, was not considered a priority. An example of this situation was provided by a participant farmer experiencing pest intrusion in his chilli plants. He recounted how at the time of the pest intrusion he was requested to attend a workshop on best practice composting provided by MoFA. When he requested information from the same visiting MoFA staff about the pest intrusion they were unable to provide any solutions.

MoFA participants commented on their own knowledge deficits in attempting to provide more accurate and relevant agricultural information to farmers and noted that these were a result of limited budgetary support for training and field visits. However, MoFA also noted that farmers' requests for technicians to stay longer in the field were unrealistic as their families required them to be back at home. MoFA participants were appreciative of the fact that farmers wanted MoFA technicians to provide expert knowledge directed to the problems they were encountering but given the operating constraints they were unsure how to do this.

Linking changing weather patterns to climate change. Most participant farmers in this research were aware that weather patterns governing their traditional planting and harvesting had changed over the last ten years but were generally unaware that this could

be linked to climate change. Participant commentary on the increased frequency and intensity of storms causing flooding and flattening of crops were commonplace, as was the commentary on increasing periods of drought. Despite this commentary, this research noted that little was discussed about the causes of such phenomenon such as agricultural pollution.

In illustrating the lack of traction between scientific opinion on the causes of climate change, and farmers' limited understanding of the phenomenon, a telling comment from a participant school teacher noted the difficulties people had in not being able to visualise what climate change was: "Only big problems like flooding that people can see will make people think about this climate change. Otherwise, they just think it is normal weather even if it is bad (I#41). A participant environmental teacher appeared to reinforce this thinking in his thoughts on sea level rise: "People say the Maldives will vanish due to sea level rise, but it is very difficult even for me to believe this will happen" (I#32).

**Improved regulatory support for agriculture.** Participants in this research noted that improved regulatory support for farming was needed in the areas of food handling, hazardous chemical usage, and price stabilisation in local produce markets.

In terms of food handling, the advent of new western style supermarkets in the Maldives offering hygienically packaged produce, expiry dates, and refrigerated storage, brought into stark contrast the existing conditions of the Male' fruit and vegetable market and many small retailers where such facilities were often absent. In the Male' fruit and vegetable market, food was displayed in hot humid conditions and largely unprotected from pests. This research noted that decomposing food was put to one side and usually removed at the end of the day. In the interim, its decomposition had accelerated accompanied by foul odours. In view of these conditions, many participants in this research called for regulation governing the handling of food within the supply chain, particularly during post-harvest where packaging, distribution, storage, and display should be regulated to a comparative standard to that of supermarkets.

In the case of regulation to assist price stability in local markets, few suggestions other than tariffs and quotas on food imports were forthcoming from participant farmers who hoped these would curtail the rapacity of food traders. As previously mentioned, these suggestions were dismissed by MoFA due to the perceived distortion of the food market that would result.

The wider point to emerge from discussion concerning regulation was its enforcement. MoFA participants noted that the enforcement authorities often lacked the manpower and technical knowledge necessary to enforce regulation. They quoted the example of imported pesticides containing banned chemicals as regulated and included in the Draft Pesticide Bill 2010. Similarly, MoFA participants noted there was limited technical capacity for identifying invasive species within organic matter and plant species at the border entry points into the Maldives.

**Improved incentives to invest in agriculture.** Funding. Participant farmers noted the need to provide concessionary funding to incentivise investment in agriculture. They contended that such funding should comprise low interest rate loans with low collateral requirements, lengthy payback periods, and a moratorium period on loan/interest payments at the beginning of the loan period. Accompanying the expression for increased access to agricultural funding, participant farmers noted that lending institutions in the Maldives should be more attuned to the employment of technology in agriculture as a potential pathway to agricultural sustainability.

Land tenure reform. Participant farmers cited the informality of land tenure on inhabited islands as a disincentive to invest in plant and equipment that would improve land stewardship. Participants in this research requested that farmland on inhabited islands be afforded similar terms and conditions to land tenure arrangements for commercial agricultural islands. This included security of tenure where rent, lease timeframe, and agricultural activity were all predetermined and enshrined within an agricultural lease.

In commenting on the land tenure arrangements on inhabited islands in this research, participants noted the ad hoc land allocation system by Island Councils where some councils would provide land free of charge, and others would charge a nominal rent. In any event, this research observed, that there was little security of tenure within either of these arrangements as land was regularly reassigned if it was required for other uses. This hardly encouraged the building of sustainable capacity in agricultural practices such as land stewardship.

Bureaucratic simplification. Participants in this research noted that a simplification in bureaucratic process that intersected with agricultural activity would encourage investment in the sector. Whilst applicable to commercial, semi subsistent and subsistent farming alike, many participants noted their desire to see a one stop agricultural agency handling such

issues as land allocation, permits for input importation, licences for market stalls and so forth. At present participants noted that it was a collection of government departments and Island Councils that administered such matters. A case in point was noted by a participant agro dealer who revealed some departmental confusion over the import duties for fertiliser, depending on whether or not it was packaged in polypropylene sacks.

This research noted that incentives to invest in agriculture would probably encourage more private sector investment into commercial agriculture, as much as it would encourage subsistent and semi subsistent farmers to adopt a more commercial approach in their farming ventures.

**Improved accessibility to farming technology, and infrastructure.** Participant farmers emphasised their desire for improved accessibility to technology and infrastructure. They posited technology such as greenhouses with hydroponic systems would be financially sustainable whilst building the technical capacity of farmers. Participants further contended that the employment of technology to assist in building profitability would encourage youth participation in agriculture. Youth participation in agriculture was regarded by many participants in this research as the core upon which agricultural sustainability depended. Participant farmers further posited that expanded island infrastructure in terms of power generation, harbours, desalinated water, and so forth, would build sustainable capacity into agricultural practices.

Despite the requests for improved access to technology and infrastructure, the research noted a glaring contradiction where MoFA assisted cooperative projects providing technology in the form of poly tunnel greenhouses with hydroponic watering systems, had become dysfunctional and remained unused. Mismanagement and disinterest by cooperative members characterised this dysfunctionality. An examination of this predicament led me to enquire whether the unused assets could be sold to private farmers wishing to pursue greenhouse production. In line with earlier reference to the sociocultural context of island farming, I was informed that such an action would almost certainly cause some jealousy and resentment in the community, particularly if it was perceived that he farmer had paid a low price for community equipment and then was successful in producing crops.

## 7.7. How can farmers in the Maldives build agricultural capacity through sustainable means?

Analysis of the coding relating to the preceding three sections of this chapter established a six-point farming framework which answers the main research question: *"How can farmers in the Maldives build agricultural capacity through sustainable means?"* The six point farming framework comprises the following:

**Table 17. The six-point farming framework.**

- **Contextual understanding**. Improved cognizance of the sociocultural construct of farming on islands in the Maldives.
- **Individualism.** The acceptance and building of individualistic farming capacity.
- **Entrepreneurialism and profitability**. The capture of entrepreneurialism and promotion of profitability in farming.
- **Migrant labour.** The improved recognition and utilisation of migrant labour as a valuable resource for Maldivian agriculture.
- **Knowledge transfer.** The greater dissemination of agricultural knowledge, particularly to the youth.
- **Production and marketing connectivity**. The establishment of local production hubs that are competitive with food imports.

An examination of the six-point farming framework now follows.

### Contextual understanding. Improved cognizance of the sociocultural construct of farming on islands in the Maldives.

This research noted the paucity of contextually based rationale underpinning sociocultural considerations in MoFA/donor interventions designed to assist farmers in the Maldives. Indeed, it appeared that the interventions were largely driven by economic considerations emphasising the uplifting of vulnerable groupings through their inclusion in mainstream agricultural activity. To a lesser degree, economic considerations were accompanied by environmental considerations espousing a reduction in the agricultural pollution of soil and water resources with remedies such as integrated pest management and the composting of vegetative and fish waste. However, sociocultural considerations which addressed how the

interventions would best fit within the context of island agriculture, and significantly what farmers thought of these interventions, appeared sparsely represented.

This research noted that participant farmers' views could have been heard more clearly by agricultural policy makers. It also noted that farmers themselves could have amplified their voice in speaking to policy makers instead a simply paying lip service or being dismissive of interventions designed to build sustainable capacity into their agricultural practices. Irrespective of these shortcomings, what did become clear as this research progressed was the mindset of the farmers ultimately determined what part [if any] of the interventions would be implemented and continued. In short, the interventions had to be driven by the farmers if they were to be successful. In view of this, this researcher contends that the farmers' voice needs to be amplified in speaking to the agricultural policy makers, and the policy makers need to provide an expanded space for soliciting the thoughts and views of farmers in the formulation of agricultural policy and intervention programmes. While much of this suggestion appears logical, my experience of working in the local agricultural sector noted that the rigours of policy and programme implementation could sometimes defuse the significance of listening more carefully to the farmers' voice.

A prominent example of where the volume of the farmers' voice needed to be amplified was with the introduction of cooperatives. Quite simply, agricultural cooperatives were unfamiliar to island communities and their modus operandi was viewed with some suspicion. As previously noted in this thesis, Maldivian farmers were prepared to accept cooperative principles in getting along and helping each other in times of difficulty. However, this cooperation did not typically extend to membership of a formalised cooperative structure prescribing terms of operation in areas such as production schedules, and it definitely did not extend to cooperatives acting as financial intermediaries on behalf of farmers.

This research posits that the slippage in contextual sociocultural consideration in MoFA/donor interventions may have occurred in the interventions' planning phase where competing streams of influence were flowing at different speeds, and in some instances, in different directions. The streams of influence within this metaphor were noted as, MoFA, the interventions' donors, and the intended programme beneficiaries, all of whom sometimes wanted different things at different times, and in different ways. In elaborating on this finding, this research noted that the lack of traction between these three main actors mainly occurred during the implementation phase of interventions where its slow

pace and sometimes haphazard process caused frustration and negative feeling amongst all three groups of actors for different reasons. An example of this was noted during the fund disbursement procedure to FADiP cooperatives, where GoM had specific guidelines for fund disbursement that were sometimes at variance with those of the donor agency and of complete confusion to the cooperatives' farmers. Adding to this predicament were cooperative farmers' requests for equipment to be provided rather than the funds to purchase them; this was due to the cooperatives' lack of capacity in being able to identify suitable equipment and transport it to the island.

This research observed that when difficulties occurred during programme implementation, there was a likelihood of compromise between all actors. In the case of the beneficiary farmers, the research found that they usually acquiesced in terms of what and how they were given assistance. However, it was noted that this acquiescence sometimes appeared without the farmers' enthusiasm and commitment to participate in the programme beyond the implementation phase. MoFA appeared cognizant of farmers' creeping disinterest as a result of delays in programme implementation but had little to mitigate its impact. In short, farmer interest in some of the programme interventions had in itself become unsustainable, and so the capacity building interventions often fell by the wayside.

Before presenting recommendations to address contextual sociocultural deficits in intervention planning and recommendations for other points in the farming framework, I refer to another contextual viewpoint in consideration of recommendations directed towards MoFA, which is based upon my work experience in this Ministry. MoFA have encountered numerous monitoring and evaluation reports where log frames, swot analyses, rapid participatory appraisals and assessments have all been accompanied by recommendations that are sometimes difficult or even impractical to implement. In short, they often appear not to be contextually driven but rather favour a development agenda conventionality endemic within many donor funded interventions. With this in mind, I err on the side of realistic expectation in terms of the recommendations put forth, whilst believing their best fit and deliverability are possible within the present agricultural policy and programme environment in the Maldives.

**Box 11. Recommendation 1.**

- Establish a Farmer Framework Forum (FFF) to discuss potential MoFA/donor assistance over the short to medium term and how this intersects with agricultural stakeholders' perceptions and expectations.
- Target areas of intervention assistance and potential beneficiary groups.
- Emphasise qualitative data collection methodology in formulating future interventions. This will reveal the 'how' and 'why' of farmers' experiences and shape how greater traction between the implementing agency and the intended beneficiaries can be achieved.
- Develop a qualitative data collection platform. Quantitative data collection methodologies would also be used where appropriate.
- Develop a template of open ended questions within semi structured interviews and focus group discussions for qualitative data collection.
- Identify trusted intermediaries to communicate with farmers and collect qualitative data.
- Train intermediaries in qualitative data gathering emphasising the significance of researcher bias, ethics, and data validity.
- Provide training in data triangulation in order to test data reliability and accuracy. Data from interviews, discussions and field journal observations would be used.
- Develop a coding system for data analysis including relevant software and data entry guidance.
- Develop a system for converting results of data coding into intervention guidance.
- Commence data collection by identifying intervention beneficiaries.
- Establish contact with relevant Island Councils and identify island gatekeepers to assist data collection.
- Embark on data collection.
- FFF to discuss and validate [or not] the findings of the data collection and devise contextually driven interventions.
- Obtain a 'buy in' for the implementation of the interventions from relevant stakeholders including MoFA, donors, and intended beneficiaries.
- Commence implementation process providing regular progress updates to all involved actors.

## Individualism. The acceptance and building of individualistic farming activity

The literature relating to traditional farming practices in the Maldives observed that individuals within family farming units undertook the majority of farming activity. The work functions of cultivation and harvesting were typically undertaken by women, whereas, men assisted with heavier work, and negotiated with the factor and producer markets. This research has indicated that individuals and family farms were often assisted by migrant agricultural labour. In addition to the family farming units, this research noted that groups

of farming friends sometimes shared the more onerous farming tasks of land clearing and weeding.

The traditional preference for individualistic farming on Maldivian islands appeared rooted in a 'managed intimacy' where small island communities desired social cohesion and harmony but were aware that overfamiliarity could lead to confrontation and conflict which would be difficult to manage in a small island community. While degrees of communality were necessary and desirable within the operation of farming, this did not usually extend to a closeness concerning specific work functions such as production practices and sourcing customers, and especially in handling money.

This research noted that individualistic behaviour was further rooted within traditional client patron relationships where the island hierarchy preferred individualistic practices as opposed to collective practices whose action may threaten hierarchical authority. In the case of farming, hierarchical action by influential island khatib's had influenced land allocation, water rights, selection for institutional assistance, and so forth. Whilst less detectable in today's agricultural activity, this research noted residual traditionalistic deference towards authoritarian bodies such as Island Councils and wealthy trading families.

This research noted that preferences for individualistic farming were today aided by improved telecommunication and transportation connectivity. This enabled the bypassing of traditional communal decision making in favour of direct contact with interlocutors such as input suppliers and produce traders. In the case of cooperatives, many farmers believed they could operate independently of the cooperatives' produce buying and selling mandate as they had developed their own linkages to factor and producer markets. This research further noted that the cooperative role as a financial intermediary was in stark contrast to the farmers' belief that financial matters better resided within the direct control of the family unit.

Whilst many participant farmers in this research had petitioned MoFA to assist them with their production and marketing functions, and MoFA had dutifully responded with approaches based on collective production and marketing models, most participant farmers remained uncomfortable with the cooperative model and preferred to retain their individualistic approaches to farming.

**Box 12. Recommendation 2.**

- FFF discussion on how individualistic farming activity within the Maldives can be more effectively captured within MoFA/donor interventions.
- Examine new donor options to partner with farmers such as philanthropic organisations and foundations.
- Conduct participatory assessment on sample islands in order to understand the nature of individualistic farming activity. This to include: demographic profiling of who is farming; farm labour functions; funding accessibility; farmer connectivity to factor and producer markets; profitability; infrastructure and technology accessibility, and so forth.
- Examine how the family unit intersects with individualistic agricultural activity.
- Examine how migrant labour intersects with individualistic agricultural activity.
- Examine how informal groupings of friends intersect with individualistic agricultural activity.
- Examine how cooperatives intersect with individualistic agricultural activity.
- Examine how vulnerable groupings intersect with individualistic agricultural activity.
- Examine how island hierarchy intersects with individualistic agricultural activity.
- Examine how women, men, and youth intersect with individualistic agricultural activity.
- Examine how MoFA and donor partners intersect with individualistic agricultural activity.
- FFF to trial a pilot project directed towards building sustainable capacity in the agricultural practices of individual farmers.
- Pilot project to define strategies for: participant buy in; selection process of participants; project goals, purpose, outputs, activities and inputs; evaluation and monitoring; follow up action.
- FFF to share findings of pilot project with MoFA/donors with a view to incorporation into current agricultural policy and programme environment.

## Entrepreneurialism and profitability. The capture of entrepreneurialism and promotion of profitability in farming.

This research noted a strong strand of entrepreneurship running through Maldivian society, where its members realised the necessity of exploiting the country's narrow resource base in order to assist their survival. Traditionally, entrepreneurship was directed towards those activities that generated the greatest profit such as fishing, shipping, trade, and latterly luxury tourism. Consequently, it is these sectors, especially tourism, who captured the majority of investment and entrepreneurial capacity, with agriculture remaining largely unattractive to both investment and entrepreneurial capacity.

In spite of this gloomy picture, this research noted that strands of entrepreneurship resided within individualistic farming activity, particularly where subsistence farmers had graduated to a semi subsistence level. This was evidenced by investment in technology and expansion

in order to serve new markets, sometimes within the tourist sector. Similarly, the development of commercial agricultural islands demonstrated agricultural entrepreneurial capacity where investment in expertise, technology, infrastructure and equipment had captured more of the local market although this research was unclear as to what extent.

This research found that individualism was at the core of entrepreneurship, which in turn was motivated by profit. Profitability in farming was cited throughout this research as the participants' main motivation for engaging in agricultural activity. Without profit, participant farmers regarded agriculture as not worthy of their time, effort, and resources. However, this research noted that the presence of profitability in farming was often unclear due to poor record keeping.

**Box 13. Recommendation 3.**

- Participatory assessment of residual island entrepreneurship with reference to its applicability to island agriculture.
- Target agricultural entrepreneurs for capacity building.
- Capacity building of agricultural entrepreneurship through mentoring with business leaders, institutional organisations such as Bank of Maldives, GoM departments and donor community.
- Training in the relevance of recording financial status.
- Training in the compilation of financial records such as profit & loss account, cash flows, budgets, balance sheets.
- Training in financial planning for profit and loss management.
- Pilot project supporting best practice financial management to selected farmers. Management of pilot project as mentioned for previous pilot.
- Devise a strategy on how to share benefits of agricultural entrepreneurship with vulnerable groupings.
- Incorporation of greater emphasis on agricultural entrepreneurship and financial management in MoFA/donor interventions.
- Link capacity building in agricultural entrepreneurship and financial management to other GoM interventions such as SME loan schemes through the Ministry of Economic Development. Agricultural falls under the SME classification.

## Migrant labour. The recognition and improved utilisation of migrant labour as a valuable resource for Maldivian agriculture.

The success of high-end tourism and its associated industries in the Maldives created an economy that sought an almost unfettered flow of migrant workers into the country to service employment requiring manual labour. The overspill of some of this labour was to be found in the agricultural sector assisting with the cultivation of crops for families with field plots, and on larger semi subsistent and commercial farms. Participant farmers regarded the majority of migrant agricultural labour as hardworking and with some inherent agricultural knowledge gleaned from their rural communities in Bangladesh and southern India. It was further noted in this research that migrant labour provided better value for money than its sparsely represented Maldivian equivalent.

This research found that the integration of Bangladeshi farm labourers into island life was successful, mainly due to a strong work ethic and a willingness for undertaking work that was unappealing to Maldivian farmers. The entrepreneurial spirit of many labourers also came to the fore as they engaged in a series of activities within the agricultural supply chain such as renting field plots to grow their own crops. The crops would be transported to Male' through friendly Bangladeshi boat crew for sale through Bangladeshi rented market stalls. The expanded scope of migrant labours' agricultural activities from growing crops to renting market stalls was usually undertaken through Maldivian nominees since its operation contravened Maldivian labour laws. The nominees in turn received a rent for their role.

This research observed that the reaction to the increasing influence of Bangladeshi workers in the Maldivian agricultural supply chain was condemnatory amongst those actors it displaced. In particular, Maldivian market traders often felt marginalised by the Bangladeshi cartel of traders operating in and around the Male' market, as the Bangladeshi traders were able to control much of the produce pricing due to their nimbleness in reacting to produce shortages and surpluses. Conversely, MoFA participants offered a more sanguine view regarding the immersion of Bangladeshi labour into the agricultural sector, as they noted that its presence and activity kept the agricultural sector functioning.

**Box 14. Recommendation 4.**

- FFF discussion on the role of migrant agricultural labour, and the extent to which it could be redefined to assist in building sustainable capacity into agricultural practices.
- Examination of the extent to which migrant labourers are immersed within the agricultural supply chain. This would require a deft touch considering many labourers are undocumented and fearful of the authorities.
- Negotiation with institutions for a dispensation allowing agricultural labourers to operate within the agricultural supply chain beyond labouring functions. This could be on a trial basis within a defined timeframe specifying the nature of operation.
- Training for migrant agricultural labour using a trainer of trainer's format. Training to be delivered in local languages. This could be supported through S. Asian diplomatic missions in Maldives liaising with regional agricultural colleges for assistance. Reputable agricultural colleges exist in Bangladesh, India and Sri Lanka.
- Training to include: best practice planting, cultivation, harvesting, storing, packaging, and distribution; food handling hygiene; correct usage and application of chemical pesticides and synthetic fertilisers; integrated pest management and composting methods; the integration of technology into traditional farming practices; local language training to enable better interaction with factor and producer markets, and so forth.
- FFF discussion restating the logic of empowering the resource which effectively undertakes the majority of agricultural labouring. This action would seem compelling in building sustainable capacity into agricultural practices.

## Knowledge transfer. The greater dissemination of agricultural knowledge.

The absence of agricultural learning in school curricula had previously been discussed by participant schoolteachers who called for its inclusion as a dedicated subject as in the case of fisheries science. However, many participant schoolteachers acknowledged that the traditional cognitive schema residing in students' minds involved farming as hot, hard, dirty, poorly paid work in fields. They contended this needed to be replaced with a cognitive schema in which technology such as greenhouses with hydroponic systems enabled cleaner non field based agriculture which could be profitable. Therefore, the cognitive hooks to lure student/youth participation into agriculture were seen as technology, cleanliness, and profit. Participant schoolteachers believed this approach could result in new agricultural knowledge binding with student aspirations and resulting in youth 'buy-in' into building sustainable capacity into agricultural practices.

The parental view of disseminating agricultural knowledge to the youth occupied a contradictory position where parents lamented the dearth of youth interest in agriculture,

while encouraging their own children not to choose agriculture as a career. Parents felt their children could better utilise their education by obtaining employment with 'desk jobs' in the civil service or tourist sector. Predictably, the majority of participant youth interviewed in this research largely mirrored their parents' negativity of agriculture as a career characterised by hot, hard, poorly paid, dirty work, undertaken by migrant labour. While some participant parents and youth acknowledged that the application of technological innovation could shift agriculture from field plot cultivation to controlled environment production, they seemed pessimistic about availability of such transformative technological options for their children and island communities.

Moving from agricultural learning in schools to knowledge gaps amongst farmers, this research noted the knowledge deficit causing most concern related to the misuse of chemical pesticides and synthetic fertilisers. Whilst concern centred on the potential negative impacts to human health and degradation of soil and freshwater resources, their use continued unchecked. Countering the concern over agricultural pollution was the farmers' desire for quick fix solutions to pest control and soil nutrient replenishment which they believed were provided through chemical products. This research noted that MoFA's extensive effort in advocating integrated pest management and composting as alternatives to chemical pesticides and fertilisers bore little fruit with most farmers continuing as they had done before.

In this research participant farmers acknowledged that they had little knowledge of linking agricultural pollution to climate change impacts such as rising sea levels, increased storm frequency and intensity, and prolonged dry periods. Indeed, most participant farmers were unsure as to climate changes' cause, physical manifestation, and measures to mitigate its effect.

In addressing agricultural knowledge gaps amongst the agricultural community, MoFA had noted that such gaps also extended to its extension services where budgetary shortfalls constrained technical training and visits to island communities. However, this research had noted that the fledgling commercial agricultural sector appeared willing to consider sharing its knowledge base, and in some instances, its facilities in furthering agricultural knowledge to farmers. The same willingness in sharing skill sets and knowledge came from the tourist sector in terms of familiarising farmers with the rationale behind their produce requirements in terms of quality, quantity, pricing, delivery and variety.

**Box 15. Recommendation 5.**

- FFF discussion on agricultural learning to fill knowledge gaps.
- Advocacy for the inclusion of agriculture as a dedicated subject in school curricula.
- Advocacy for extra curricula agricultural learning both through classroom theory and school field plot practical application.
- Increased media agricultural learning through TV/radio programming ranging from plant management, customer interaction, nutrition and healthy eating, and so forth.
- Co-opt farmers (commercial, semi subsistent, subsistent) into agricultural knowledge exchange forums with schools and resorts.
- Co-opt tourist resorts into knowledge exchange forums with farmers and schools.
- Mentoring programme where farmers and resorts could mentor youth in developing agriculture.
- Pilot projects for schools demonstrating the use of agricultural technology through the use of greenhouses with hydroponic systems coupled with financial management where students operate pilot projects for profit.

## Production and marketing connectivity. Creating local production points that are competitive with food imports.

Commentary from participant farmers in this research revealed their main concern was in connecting with producer markets, and to a lesser extent factor markets. In terms of producer markets, participant concern focussed on the inability to sell production at a desirable selling price, and to avoid produce remaining unsold. In the case of factor markets, the affordability and availability of farming inputs registered some concern amongst participant farmers.

Producer markets. The research noted that participant farmers tended to produce crops they were familiar with, they were good at growing, and that had sold well in the past at a reasonable profit. However, it was noted that farmers were unable to satisfy the increasing food demand that required increased quantities and varieties of food at competitive prices and on a continual basis. This was mainly due to poor market connectivity where farmers were unaware of what the market required, and limited productive capacity where knowledge, equipment, and, funding deficits hindered the production of what the market required.

According to many participant farmers in this research, producer markets were further clouded by the increased activity of food traders dealing in imported food. Participant traders noted that external food suppliers could react considerably more quickly in processing and delivering orders to the Maldives, than local farmers could in supplying their produce to the Male' market. Therefore, for many food traders, imported food with its

consistent quality, competitive pricing, and significant variety became an easier and more profitable option in supplying their customers. This research found that participant farmers felt marginalised by this situation and somewhat confined to producing limited crop quantities and varieties for small markets. Some farmers added that their contribution was regarded by traders as a stopgap in filling shortfalls in imported produce.

Compounding the food trader preference for imported food, participant food traders noted that the Maldivian consumer increasingly required hygienically packaged produce that was displayed in an air-conditioned environment. They noted that local produce sold in the Male' market was often of an indeterminate age, and in varying states of decomposition having been transported and stored in non-refrigerated conditions. In summing up the farmers' predicament in terms of their connectivity with producer markets, it was noted that local producers were not providing what the market wanted, hence, the market looked elsewhere for its produce supply.

At the heart of MoFA's drive towards improving market connectivity for farmers were interventions that sought to capitalise on the presence of the lucrative tourist sector market. However, MoFA realised that the productive capacity of local farmers could not meet the tourist sectors' requirements, hence, interventions were developed to build productive and marketing capacity through the establishment of cooperatives in the hope of better connecting with the tourist sector requirements. MoFA had also realised that the successful proliferation of food imports into the Maldives had diluted the desire to bolster national food security through local production. Although this situation was predicated on purchasing capacity that could rapidly diminish, it was nonetheless a formula that had sustained food supply to the Maldives since the seventies.

Factor markets. Participant farmers noted sporadic accessibility to factor markets supplying imported farming inputs such as seed, fertiliser, and equipment where pricing and availability would fluctuate depending upon externalities such as international cargo rates, global commodity pricing, and currency movements. MoFA participants acknowledged this problem, and persistently encouraged farmers to adopt localised solutions to farming challenges in order to minimise the expense and sporadic availability of imported inputs. As has been previously mentioned this included such measures as integrated pest management and composting. However, the desire for quick fix solutions to pest intrusion and soil nutrient depletion meant that demand for imported pesticides and inorganic

fertilisers persisted and expanded as noted by the increasing number of agro dealers located in the capital Male'.

**Box 16. Recommendation 6.**

- FFF discussion on the role of factor and producer markets and how they connect with farmers. This discussion to include resort operators and commercial food distributors.
- Target the major drivers and barriers in the agricultural supply chain in terms of market connectivity.
- Update the data for national agricultural productive output drawing on MoFA's existing expertise and assisting its enhancement where required
- Update the data for food imports drawing on the expertise of Maldives Customs Services.
- Analysis of production and food import data to order to map what areas of local food production best fit with market demand. This could include the trialling of new crop varieties
- Encourage partnering of farmers with neighbouring resorts in developing localised produce markets.
- Encourage partnering of farmers with neighbouring resorts in developing improved connectivity to factor markets. This may involve resorts providing small cargo space of their supply vessels traversing the Male' route in order to bring farming inputs to neighbouring farmers.
- Pilot project on sample island to test solutions countering market dysconnectivity. Outcomes to be shared with FFF.

## 7.8. Chapter summary

Despite poor market connectivity being noted by participants in this research as the main challenge to farmers in the Maldives, further investigation revealed that this was a symptom of a wider dysfunctionality that resided within the scope of agricultural interventions provided by MoFA and its donor partners. According to this research, the nature of the dysfunction appeared to be a lack in appreciation of the sociocultural context in which island farming operated. The theory of this research followed that if this dysfunction could be addressed through recalibrated MoFA interventions, then improved market connectivity, as well as de-stigmatised and more profitable agriculture, could be undertaken by farmers and their families.

In addressing MoFA interventions, MoFA and its donor partners were urged to refine their understanding of 'how' they envisaged their programme interventions would operate within the sociocultural construct of the islands where their intended beneficiaries resided. Previous MoFA programme interventions had largely prioritised economic advantage for

vulnerable groupings through their inclusion in farming activity. To a lesser extent, environmental concern for the polluting effects of agriculture had also been included. However, there was little evidence to suggest that sociocultural consideration had been featured as a partner in MoFA programme interventions aimed at building agricultural capacity through sustainable means.

Profit was clearly identified by participant farmers as their main understanding of how agricultural capacity could be built, and thus, how agricultural sustainability could be achieved. However, mention of profitability in MoFA/donor programme documentation was scant despite the focus on economic considerations. This omission prompted the research to enquire as to why the concept of profitability, as the main motivator for engaging in farming, was largely absent from the documentation.

As individualism and entrepreneurialism already resided in Maldivian agriculture, this research suggested that it should be incentivised by MoFA through its prioritisation in future interventions. The resulting benefit derived from building individualistic and entrepreneurial capacity could be shared with those vulnerable groupings that have traditionally occupied the priority in many MoFA interventions. In short, a platform comprising farmers with inherent agricultural capacity may more effectively reach those subsistent farmers in need of assistance.

Successful, naturally occurring collective approaches to marketing, and to a lesser extent production, were evident on some large agricultural islands in the Maldives. However, on these islands, MoFA led cooperative models were largely absent, with farming communities expressing a preference for their own brand of home grown agricultural collectivisation. The modus operandi of such collective approaches required further examination to see how they functioned within the sociocultural island construct, and how those participating farmers interacted with the benefit they provided.

Migrant agricultural labour was a largely untapped resource in terms of its flexibility and entrepreneurship. This labour was noted in the research as a hardworking high performing resource that through its regulation was confined to the role of manual labouring. In reality, there was no such confinement as its impressive entrepreneurial capacity engaged in multifaceted agricultural activity. The research suggested this resource be officially empowered to enhance its contribution in building sustainable capacity into agricultural practices.

Participant farmers recognised their agricultural knowledge deficits particularly in the area of pesticide misuse having a detrimental effect upon human health and the environment. Apart from mention of crop damage caused by flooding, high winds, and drought, little other environmental concern was registered throughout the research. Similarly, the linking of such weather phenomena with climate change was largely absent. This was perhaps indicative of the need for substantive knowledge transfer covering specific environmental challenges encountered by farmers now, and in the future with reference to climate change and it impacts on Maldivian agriculture.

The willingness of the fledgling commercial agricultural sector and tourist resorts to share skill sets and knowledge in farming technology and food requirements was evident in the research. Despite overtures to farming communities by these bodies, offers in transferring knowledge often remained underutilised.

The recommendations put forward in this chapter were largely derived from analysing the nuggets of farmers' experiences. These experiences have been shaped by a policy and programme environment that has not relied as much as it could have on the farmers' voice. Within this environment, MoFA's strident efforts along with its donor partners in providing assistance to farmers has been praiseworthy, as has the effort expended by many Maldivian farmers in trying to make the interventions work. However, this research has noted intervention slippage where a loss of traction between MoFA, its donors, and the intended beneficiaries has sometimes resulted in dysfunctional projects and disinterested participants. In view of this situation, the research believes that a recalibration of institutional assistance where the farmers' voice is amplified in the design and implementation of interventions can build the sustainable capacity in agricultural practices that is desired by all stakeholders.

# Chapter 8. Conclusion

## 8.1. Introduction.

The investigation into building sustainable capacity into agricultural practices in the Maldives revealed that agriculture played a largely secondary role to fisheries and tourism despite involving an estimated two thirds of the population in its activity (IFAD, 2006). Agriculture was thus characterised by subsistent and semi subsistent farming with occasional forays into commercialised farming. Acknowledging the secondary status of agriculture in Maldivian society, the GoM had sought to elevate its profile and performance in order to become the third pillar of the economy after tourism and fishing. The proposed elevation was most noticeably articulated in the 2009 Strategic Action Plan, where agricultures' destigmatising as a low class activity, and its need for knowledge learning and infrastructural support, formed part of the prescription to commercialise its operation (GoM, 2009). Accompanying governments' plans for agricultural advancement were various MoFA policy and programme interventions that sought to build the capacity of the agricultural sector through sustainable means. As mentioned in chapter 1, *Introduction*, such means included technical training, knowledge transfer, technology utilisation, and collectivised farming. Despite the best efforts and intentions of MoFA and its donor partners, this research revealed limited traction between the MoFA/donor led interventions and their intended beneficiaries, which often resulted in unintended and disappointing outcomes characterised by dysfunctional projects and disinterested participants. This research then sought to investigate the reasons behind this lack lustre performance with a view to suggesting ways in which building sustainable capacity into agricultural practices could be enhanced.

## 8.2. Structuring the research.

In structuring this research, a review of the relevant literature as contained in Chapter 2, *Literature Review,* enabled me to obtain a greater theoretical understanding of the issues underpinning agriculture in developing countries, small island developing states (SIDS), and the Maldives. In reflecting upon the value that the literature review contributed to this research, I realised that whilst I had an understanding of economic and environmental issues relating to agricultural sustainability in the developing world, I had not always appreciated the sociocultural context in which they existed. In reference to SIDS, this was of particular significance as scholarship such as Srebrnik (2004) informed me of that the SIDS

characteristics of smallness and remoteness engendered community unification as people realized it was easier to get along with each other than to maintain confrontational relationships. Lowenthal (1987) took this further by alluding to a “managed intimacy” (p.39) where negative feelings were often masked for the sake of social harmony.

Commenting on the Maldives, the scholarship of Maloney (1980) agreed that smallness and relative isolation engendered community unification. However, Romero-Frias (1999) added that whilst this could lead to feelings of self-containment, it did not always lead to contentment, as internal occurrences that were associated with anything out of the ordinary could cause resentment and jealousy. This research found this was particularly the case with crops that had excelled and had then been vandalised or stolen out of jealousy. The research further noted that feelings of island community unification were often juxtaposed with the strong individualistic traits exhibited by Maldivian farmers. In some cases, the individualistic traits of farmers ran contrary to MoFA’s attempts at implementing interventions which in itself caused some internal disruption. Nowhere was this more evident than with MoFA’s attempt to implement collective farming structures, such as cooperatives, into communities where farmers felt more comfortable either farming individually, within family units, or in a few instances with a small group of friends.

Chapter 3, *Methodology,* in this study dealt with the research methodology employed in collecting and analysing the research data. The research method used was a multisite case study that pursued a phenomenological line of inquiry placing the farmers as the phenomenon or case being studied. Bound within the case, were the island communities in which the farmers operated and the experiences of intersecting agricultural stakeholders such as, MoFA, input suppliers, food customers, and donor institutions. Data was collected from multiple sites where a variety of farmers and agricultural stakeholders participated in interviews and focus group discussions. The data from both collection methods was triangulated with field journal entries made by myself throughout the duration of the research. As guided by Cohen et al. (2013), triangulation of the data was undertaken to ensure its reliability and validity. Analysis of the data in the multisite case study was undertaken through reductive coding where themes were placed into categories and then coded. Ten codes emerged comprising forty-three subcodes. From the ten codes, six core codes emerged which formed the basis of the six-point farming framework. The six-point farming framework with accompanying recommendations answered the research question.

Chapters four, five, and six of this research presented the raw primary data of farming experiences in the Maldives. Chapter 4, *Findings (1) Farmers understanding of the terms 'sustainable agriculture' and 'building capacity in agriculture'* established that the participants baseline understanding of the terms 'sustainable agriculture' and 'building capacity in agriculture' were rooted in agricultural activity being profitable. Participant farmers contended that inherent agricultural capacity would lead to sustainable farming practices. Sustainability was associated with continuity in farming which would only be contemplated if farming was profitable. Participant farmers contended that if farming was unprofitable there was no point in doing it. A few participant farmers further posited that 'building capacity in agriculture' would lead to profitable agriculture and thus 'sustainable agriculture'.

Chapter 5*, Findings (2) The key factors encountered by farmers in the Maldives,* noted that profitable farming could be achieved more effectively by individuals and family units rather than collectivised structures such as cooperatives. It was widely commented upon in the research that such individualistic activity was in large part assisted by migrant agricultural labour mainly from Bangladesh. This labour further displayed impressive entrepreneurial flair in capturing not only agricultural production but also the transportation and selling of produce to other islands and in the main market in Male'.

Chapter 5 further noted that the de-stigmatisation of agriculture as a low-class activity stood a better chance of succeeding if agriculture was included as a subject within school curricula where it could be presented as a technologically driven agribusiness. In this way it may appeal to youth in terms of future employment. Some participants argued that agricultural learning both within the school curricula and more widely directed to farmers would assist in diluting its association with being a pastime for the aged, and an activity for low income families and migrant labour. The juxtaposition of migrant labour being noted as necessity for agricultural labouring, a contributory cause to its low-class stigmatisation, and the sectors engine for growth through its impressive entrepreneurial capacity was observed by this researcher.

Chapter 5 further dealt with the need for targeted agricultural knowledge dealing with specific farming challenges particularly in the areas of pesticide and fertiliser usage. It was argued that such knowledge was more relevant to farmers than generic training such as bookkeeping and financial planning. However, where specific training responding to the requests from farmers was provided by MoFA, it was not always taken up. This research

noted two cases in point where training on integrated pest management and the composting of vegetative and fish waste as proposed by MoFA was often side lined by farmers in favour of their preference for quick fix chemical pesticides and synthetic fertilisers.

Chapter 5 lastly dealt with participants belief that they required improved connectivity to both factor markets for the supply of farming inputs such as seeds, fertilisers, and equipment, and producer markets for the sale of their produce. Within the six core codes of this research, the issue of poor market connectivity elicited the greatest number of participant responses. Of particular mention by participant farmers was the limited access farmers felt they had in supplying produce to the lucrative tourist food market who mainly relied upon imported food. The fact that farmers did not possess the capacity to supply comparative quantities, quality, variety, pricing and continuity of supply characterised by imported food flows did not appear to dim farmers belief that restricting food imports would automatically boost local production to a point where much of the food imports could be substituted by local equivalents. Adding to the feeling of participant farmers market disconnection were participant resort and commercial food traders who noted that local farmers did not possess the entrepreneurial flair, technological awareness and funding to compete with imported food flows, specifically in the areas previously mentioned. In short, the tourist sector viewed imported food flows as more reliable and easier to deal with than sourcing locally produced food.

Chapter 6, *Findings (3) Measures farmers in the Maldives believe will help build agricultural capacity through sustainable means,* dealt with the desire by many participants in this research for a recalibration of MoFA's agricultural assistance to more directly address the challenges described in Chapter 5. The recalibration included greater effort to fill the agricultural knowledge gaps both amongst youth in encouraging them to consider agriculture as a future occupation, and amongst farmers to increase their productive capacity in terms of cost effectiveness and environmental conservation. While concern over agricultural pollution damaging the environment, specifically with the use of chemicals and synthetic fertilisers, was raised in the research, there was scant mention of embracing systemic land stewardship in order to promote long term environmental conservation. Concerning the wider view of environmental degradation and its linkage to climate change, few participants acknowledged the contribution agricultural pollution made to the impacts of climate change. However, many participants did question the changing seasonality and

increased frequency and intensity of weather patterns, as this affected both traditional planting and harvesting cycles. Chapter six, further highlighted the need for increased incentives to encourage investment in agriculture, including the provision of concessionary funding with low interest rates and low collateral requirement, land tenure reform where security of farmland tenure was stipulated within a regulated lease, and increased focus on incentivising investment in commercialised agriculture.

Chapter 7, *Discussion. Farmers in the Maldives building agricultural capacity through sustainable means,* analysed the ten codes that emerged from the three findings chapters, and presented the six core codes which formed the basis for the six-point farming framework. It is the six-point farming framework that answered the research question. In this chapter, the core codes were discussed referencing the relevant literature and my experience of working in the Maldivian agricultural sector. The discussion took place within the structure of the three supporting questions. The final section of this chapter answered the main research question by drawing on the six-point farming framework as detailed in table 17, *The six-point farming framework.*

In reflecting upon the structuring of the research, the inevitability of querying the research methodology arose, specifically in relation to what I would have done differently. Prior to the commencement of this research, I debated whether fewer island visits spending a longer time on each island would elicit more relevant information than a greater number of island visits spending less time on each island visited. After consultation with academics based in the Maldives and my supervisor, the consensus suggested that individual island data may be limited and, therefore, a greater national coverage visiting more islands may provide more differing data. Despite this approach, I remain curious to know whether the fewer islands visited option would have yielded similar results. In view of this curiosity, if anyone was considering a further study of agricultural activity in the Maldives, I may suggest the fewer islands option with a view to comparing the results with those of this research.

## 8.3. Next steps

Being a pragmatist by nature, I would hope that participants contributing to this research would consider some of the recommendations contained in the six-point farming framework. To recap, this involves convening a series of farmer framework forums where the six-point farming framework would examine: **the sociocultural island context in which agriculture is undertaken; the preference for individualistic farming activity; the capture**

**and promotion of entrepreneurialism and profitability in agriculture; the inclusion of migrant agricultural labour as a valued resource; knowledge transfer to farmers, institutions, and youth; and, the production and marketing connectivity between farmers and factor and producer markets.** The examination would be accompanied by pilot projects in order to test, monitor, and evaluate how the six-point farming framework has contributed to the farmers' capacity building efforts.

In concluding, I hope that the six-point farming framework will provide a roadmap to inform not only existing and future MoFA/donor interventions, but also agricultural interventions supported by other actors such as philanthropic organisations and foundations. While not a panacea for all agricultural challenges in the Maldives, the six-point farming framework will facilitate a better fit between agricultural interventions and their intended beneficiaries in building agricultural capacity through sustainable means.

## 8.4. Epilogue

The research undertaken for this study was driven by my desire to help farmers in the Maldives more effectively and efficiently connect with the assistance MoFA and its donor partners were able to offer, and indeed, with assistance all agricultural stakeholders were able to offer to each other. In doing this, I hoped farmers would build sustainable capacity into their agricultural practices, and as they had noted, become profitable for a long time.

My investigation revealed that the building blocks for creating a dynamic agricultural sector in the Maldives were represented in three main areas. Firstly, the presence of a residual base of subsistence and semi subsistence farmers that remained willing to engage in agricultural activity. Secondly, the continuing activities of MoFA interventions that strove to build agricultural capacity within a sustainability mantra through knowledge sharing and training, and thirdly, the presence of a lucrative domestic tourist market that was willing to trial local production supply. This research demonstrated that its participants now requested certain issues to be addressed in order to strengthen this confluence of agricultural interest. I believe the six-point farming framework addresses this confluence by bringing it into sharper focus in order that practical steps may be considered for future policy and programme interventions.

In nearing the end of this PhD journey, I would like to recall a brief exchange I had at the end of an interview with a participant farmer who was also an executive chef on a resort island I visited. The participant chef asked me what I was going to do with all this research

once it was completed. I replied that I hoped it would be a useful tool in the planning of agricultural development in the Maldives. He responded that as I had done the research, I should be part of putting the research recommendations into practice. I hope that I have the opportunity to do precisely this.

# References.


ADB. (2005). *Commercialization of agriculture in the Maldives. TA no. 4337-ML*. Retrieved from Ministry of Fisheries and Agriculture, Maldives.

Agarwal, B. (1994). *A field of one's own: Gender and land rights in South Asia* (Vol. 58). Cambridge, U.K.: Cambridge University Press.

Allen, L. H. (2003). Interventions for micronutrient deficiency control in developing countries: past, present and future. *The Journal of nutrition, 133*(11), 3875S-3878S.

Allison, I., Bindoff, N. L., Bindschadler, R. A., Cox, P., de Noblet, N., England, M., Francis, J., Gruber, N., Haywood, A., Karoly, D., Kaser, G., Le Quéré, C., Lenton, T., Mann, M., McNeil, B., Pitman, A., Rahmstorf, S., Rignot, E., Schellnhuber, H., Schneider, S., Sherwood, S., Somerville, R., Steffen, K., Steig, E., Visbeck, M., & Weaver, A. (2009). *The Copenhagen diagnosis: updating the world on the latest climate science*. Sydney, Australia: The University of New South Wales Climate Change Research Centre.

Alonge, A. J. (2004). *Between government and market failure: Issues, perceptions and policy challenges in reforming public sector extension services in Sub-Saharan Africa.* Paper presented at the Proceedings of the 20th Annual Conference of the Association of International Agricultural Extension and education (AIAEE), Dublin Ireland.

Alpert, E. (2011). Agro-dealers in Malawi help make sure seeds grow. Available at http://www.one.org/blog/2011/03/30/agro-dealers-in-malawi-help-make-sure-seeds-grow/. [Accessed: 24/4/14]

Armstrong, H., De Kervenoael, R. J., Li, X., & Read, R. (1998). A comparison of the economic performance of different micro-states, and between micro-states and larger countries. *World Development, 26*(4), 639-656.

Beck, C. (2008). *Statement of H.E. Ambassador Collin Beck of the Solomon Islands, on behalf of the Alliance of Small Island States (AOSIS) regarding land. .* Paper presented at the 16th Meeting of the Commission on Sustainable Development, New York, U.S.A.

Becker, C. (2012). Small Island States in the Pacific: The Tyranny of Distance. (Issues 12-223 of IMF Working Papers).

Bell, H. (1883). *The Maldive Islands, an Account of the Physical Features, History, Inhabitants, Productions and Trade* (Vol. 1). Colombo: Asian Education Services.

Bellarby, J., Foereid, B., Hastings, A., & Smith, P. (2008). *Cool farming: Climate impacts of agriculture and mitigation potential*. Amsterdam, Netherlands: Greenpeace International.

Beyer, R. (2009). *Sustainable Food Processing in the Maldives: Training Manual for Food Processors*. Retrieved from United Nations Development Programme, Maldives.

Bingen, J., Serrano, A., & Howard, J. (2003). Linking farmers to markets: different approaches to human capital development. *Food Policy, 28*(4), 405-419.

Birthal, P., Joshi, P., & Gulati, A. (2007). Vertical Coordination in High-Value Food Commodities. In *Agricultural diversification and smallholders in South Asia.* (Vol. pp. 405-440.). Washington, DC, USA: International Food Policy Research Institute.

Black, R., Allen, L., Bhutta, Z., Caulfield, L., De Onis, M., Ezzati, M., Mathers, C., Rivera, J., & Maternal child undernutrition study group. (2008). Maternal and child undernutrition: global and regional exposures and health consequences. *The Lancet, 371*(9608), 243-260.

Bogdan, R., & Biklen, S. (2007). *Qualitative Research for Education: An introduction to theories and methods (5th.)*. Boston: Pearson Education.

Briguglio, L. (1995). Small island developing states and their economic vulnerabilities. *World Development, 23*(9), 1615-1632.

Bromley, D. W. (1989). Entitlements, missing markets, and environmental uncertainty. *Journal of Environmental Economics and Management, 17*(2), 181-194.

Bruinsma, J. (2009). The Resource Outlook to 2050: By how much do land, water and crop yields need to increase by 2050? Available at ftp://ftp.fao.org/agl/aglw/docs/ResourceOutlookto2050.pdf [Accessed: 18/11/11]

Bulmer, M. (1982). *Social research ethics: An Examination of the Merits of Covert Participant Observation*. Teaneck, New Jersey, U.S.A.: Homes & Meier Publishers.

Butany, W. (1974). *Report to the Government of Maldives on agricultural survey and crop production*. Retrieved from Ministry of Fisheries and Agriculture, Maldives.

Carrasco, B., & Mukhopadhyay, H. (2012). Food price escalation in South Asia—A serious and growing concern. *South Asia Working Paper Series*(10).

Carson, R. (1962). *Silent Spring*. Boston, U.S.A.: Houghton Mifflin Harcourt.

Chambers, R., & Conway, G. (1991). Sustainable rural livelihoods: practical concepts for the 21st century. (IDS Discussion Paper 296). Available at

https://opendocs.ids.ac.uk/opendocs/bitstream/handle/123456789/775/Dp296.pdf?sequence=1&isAllowed=y [Accessed: 23/8/14].

Chein, I. (1981). Appendix: An introduction to sampling. *Selltiz, Wrightsman & Cook's research methods in social relations, 4*, 418-441.

Chinsinga, B. (2011). Agro-dealers, subsidies and rural market development in Malawi: A political economy enquiry. (Working Paper 031). Available at https://opendocs.ids.ac.uk/opendocs/bitstream/handle/123456789/2256/FAC_Working_Paper_031.pdf?sequence=1 [Accessed: 20/2/13]

Church, J. A., White, N. J., & Hunter, J. R. (2006). Sea-Level rise at tropical Pacific and Indian Ocean Islands. *Global and Planetary Change, 53*(3), 155-168.

Clover, J. (2003). Food security in sub-Saharan Africa. *African Security Studies, 12*(1), 5-15.

Coffey, E. (1998). Agricultural Finance: Getting the Policies Right. (Agricultural Finance Revisited Working Paper No. 2). Available at http://media.microfinancelessons.com/resources/afr2_part1_en.pdf [Accessed: 5/7/15]

Cohen, L., Manion, L., & Morrison, K. (2000). Action research. *Research methods in education, 5*, 226-244.

Cohen, L., Manion, L., & Morrison, K. (2013). *Research methods in education*. Abingdon, U.K.: Routledge.

Colton, E. O. (1995). *The Elite Of The Maldives: Sociopolitical Organisation And Change.* (PhD), University of London, London. Retrieved from http://etheses.lse.ac.uk/1396/1/U079701.pdf (UMI Number: U079701).

Conway, G. (1998). *The Doubly Green Revolution: Food for all in the twenty-first century*. Ithaca U.S.A.: Cornell University Press.

Conway, G. (2012). *One Billion Hungry: Can we feed the world?* Ithaca U.S.A. and London U.K.: Cornell University Press.

Corbin, J., & Strauss, A. (2008). Basics of qualitative research: Techniques and procedures for developing grounded theory. *Canadian Journal Of University Continuing Education, 36*(No. 2 fall 2010), 358.

Cotula, L., Vermeulen, S., Leonard, R., & Keeley, J. (2010). *Land Grab or Development Opportunity? Agricultural investment and international land deals in Africa*. London & Rome: IIED/FAO/IFAD.

Creswell, J. (2008). *Research Design: Qualitative, quantitative, and mixed methods approaches*. Thousand Oaks U.S.A.: SAGE Publications.

Creswell, J., & Poth, C. (2017). *Qualitative inquiry and research design: Choosing among five approaches*. Thousand Oaks U.S.A.: SAGE Publications.

De Janvry, A., & Sadoulet, E. (2006). Progress in the modeling of rural households' behavior under market failures. In *Poverty, Inequality and Development* (pp. 155-181). Boston, MA: Springer.

Delgado, C. (2003). Rising consumption of meat and milk in developing countries has created a new food revolution. *The Journal of Nutrition, 133*(11), 3907S-3910S.

Delgado, C., Rosegrant, M., & Meijer, S. (2001). *Livestock to 2020: The revolution continues.* Paper presented at the Annual meetings of the International Agricultural Trade Research Consortium (IATRC). Auckland, New Zealand.

Dey, I. (2003). *Qualitative data analysis: A user friendly guide for social scientists*. London: Routledge.

DNP. (2011). *Statistical Yearbook of Maldives 2011* (999915-96-37-2). Retrieved from Department of National Planning, Maldives.

DNP. (2012). *Household Income and Expenditure Survey 2009-2010* (99915-96-41-0). Retrieved from Department of National Planning, Maldives.

Dorward, A., Fan, S., Kydd, J., Lofgren, H., Morrison, J., Poulton, C., Rao, N., Smith, L., Tchale, H., & Thorat, S. (2004). Institutions and Policies for Pro-poor Agricultural Growth. *Development Policy Review, 22*(6), 611-622.

Drèze, J., & Sen, A. (1991). *The Political Economy of Hunger: Volume 1: Entitlement and Well-being* (Vol. 1). Oxford U.K.: Clarendon Press.

Faisal, M. (2008). *Living on a crowded island: Urban transformation in the Maldives.* (PhD background to research in progress), Victoria University of Wellington., Retrieved from http://www.devnet.org.nz/sites/default/files/Mohammed%20Faisal.%20Living%20on%20a%20crowded%20island%20Urban%20transformation%20in%20the%20Maldives.pdf [Accessed: 12/12/14].

FAO. (2004). *FAO and SIDS: Challenges and Emerging Issues in Agriculture, Forestry and Fisheries*. Paper presented at the Inter-Regional Conference of Small Island Developing States, Bahamas. Available at http://www.fao.org/docrep/006/y5203e/y5203e.htm#TopOfPage [Accessed: 3/4/14]

FAO. (2005). Maldives: Post-tsunami agricultural brief *Tsunami Reconstruction*. Available at: http://www.fao.org/ag/tsunami/assessment/maldives-assess.html [Accessed: 12/5/14]

FAO. (2006). Policy Brief. Food Security. Issue 2. Available at ftp://ftp.fao.org/es/ESA/policybriefs/pb_02.pdf [Accessed: 8/6/13]

FAO. (2010). Gender and Land Rights. Understanding complexities; adjusting policies. *Economic and Social Perspectives Policy Brief 8*. Available at http://www.fao.org/economic/es-policybriefs/briefs-detail/en/?no_cache=1&uid=40497 [Accessed 20/3/14]

FAO. (2011). Irrigation in Southern and Eastern Asia in figures - AQUASTAT Survey - 2011. Available at www.fao.org/nr/water/aquastat/countries_regions/MDV/MDV-CP_eng.pdf [Accessed: 7/2/16]

FAO. (2011a). *Selected Indicators of Food and Agricultrual Development in the Asia-Pacific Region 2000-2010* (ISBN 978-92-5-107011-6). Retrieved from Bangkok FAO Regional Office for Asia and the Pacific. Publication 2011/21

FAO. (2011b). Food Prices. From Crisis to Stability. Available at https://reliefweb.int/report/world/food-prices-crisis-stability-world-food-day-2011 [Accessed:19/8/15]

FAO. (2012). Mobile technologies for food security, agriculture and rural development. Role of the public sector. Available at http://www.fao.org/docrep/017/i3074e/i3074e.pdf [Accessed: 17/4/13]

FAO. (2012a). *Maldives Country Programming Framework 2013 - 2017*. Retrieved from Ministry of Fisheries and Agriculture, Maldives.

FAO. (2014). Climate impact on agriculture. Direct and indirect effects of sea-level rise. Available at http://www.fao.org/nr/climpag/pub/EIre0047_en.asp [Accessed: 7.6.14]

FAO. (2016). Maldives and FAO. Partnering for sustainable agricultural development and food security. Available at http://www.fao.org/3/a-ax461e.pdf [17/9/17]

FAO. (2016a). State of Food Security and Nutrition in Small Island Developing States (SIDS). Available at www.fao.org/3/a-i5327e.pdf [Accessed 2/2/17]

FAO. (2017). Fishery and Aquaculture Country Profiles. The Republic of Maldives. Available at http://www.fao.org/figis/pdf/fishery/facp/MDV/en?title=FAO%20Fisheries%20%26%20Aquaculture%20-%20Fishery%20and%20Aquaculture%20Country%20Profiles%20-%20The%20Republic%20of%20Maldives. [Accessed: 17/11/17]

FAO, IFAD, & WFP. (2013). *The State of Food Insecurity in the World: The multiple dimensions of food security*. Rome: FAO.

FAO, IFAD, & WFP. (2015). *The State of Food Insecurity in the World 2015. Meeting the 2015 international hunger targets: taking stock of uneven progress*. Rome: FAO.

FAO, WFP, & IFAD. (2012b). *The State of Food Insecurity in the World 2012. Economic growth is necessary but not sufficient to accelerate reduction of hunger and malnutrition*. Rome: FAO.

FAO / WHO. (2010). *FAO/WHO expert meeting on the application of nanotechnologies in the food and agriculture sectors: potential food safety implications. Meeting report.* . Rome: FAO / WHO.

FAOLEX Database. (2018). Environmental Protection and Preservation Act of Maldives (Law No. 4/93). from FAO

Farmer, B. (1979). The 'Green Revolution' in South Asian ricefields: environment and production. *The Journal of Development Studies, 15*(4), 304-319.

Fédération Internationale des Géomètres. (2013). Suva Statement on Spatially Responsible Governance. Available at http://www.fig.net/pub/fiji/ppt/reports/Suva_Statement.pdf [Accessed: 12/5/15]

Fédération Internationale des Géomètres (FIG). (2013a). FIG Pacific Small Island Developing States Symposium: Policies and Practices for Responsible Governance. Available at https://www.fig.net/fiji/images/Fiji_programme_v12.pdf [Accessed: 28/10/14]

Feldstein, H., & Poats, S. (1989). Working together: gender analysis in agriculture. V.1 Case studies. V.2 Teaching notes. *Kumarin Press library of management for development (USA).*

Ferguson, J. (2009). *The Anti-Politics Machine. "Developement," Depoliticization, and Bureaucratic Power in Lesotho* Minneapolis: University of Minnesota Press.

Finney, B. (2010). *Climate Change Impacts of Freshwater Resources in the Maldives: Assessing Vulnerability and Adaptive Capacity.* (MSc), Imperial College London, London.

Ford, D., Dell'Aquila, C., & Conforti, P. (2007). *Agricultural trade policy and food security in the Caribbean: Structural issues, multilateral negotiations and competitiveness*. Rome: FAO.

Freebairn, D. (1995). Did the Green Revolution concentrate incomes? A quantitative study of research reports. *World Development, 23*(2), 265-279.

Freedom House. (2011). Freedom in the World 2011 - Maldives. Available at http://www.freedomhouse.org/report/freedom-world/2011/maldives [Accessed 27/8/12]

Freedom House. (2012). Maldives Overview. Available at http://www.freedomhouse.org/report/freedom-world/2012/maldives#.U05biMaRlg0 [Accessed: 16.4.14]

Freire, P. (1970). *Pedagogy of the Oppressed. Translation*. New York, N.Y.: Continuum.

Fulu, E. (2007). Gender, vulnerability, and the experts: Responding to the Maldives tsunami. *Development and Change, 38*(5), 843-864.

Garnett, T. (2011). Where are the best opportunities for reducing greenhouse gas emissions in the food system (including the food chain)? *Food Policy, 36*, S23-S32.

Gaud, W. (1968). The Green Revolution: Accomplishments and Apprehensions. *Address by The Honourable Williiam Gaud, Administrator, Agency for International Developement*. Available at http://www.agbioworld.org/biotech-info/topics/borlaug/borlaug-green.html [Accessed: 12/9/16]

Gayoom, M. (1992). Address by His Excellency Mr. Maumoon Abdul Gayoom, President of the Republic of Maldives, at the United Nations Conference on Environment and Development, Rio de Janeiro. Available at www.un.int/maldives/unced.htm [Accessed 1/11/12]

Ghina, F. (2003). Sustainable Development In Small Island Developing States. *Environment, Development and Sustainability, 5*(1), 139-165.

Ginsburg, T. (2013). *Democratic Transition in the Maldives: An Assessment*. Retrieved from Raajje Foundation, Maldives.

Glaeser, B. (2011). *The Green Revolution Revisited: Critique and Alternatives*. Oxon., U.K.: Routledge.

Glitz, B., & Medical Library Association. (1998). *Focus groups for libraries and librarians*. New York, N.Y.: Forbes Custom Publishing.

Global Islands Network. (2012). Maldives: Baa atoll. Available at http://www.globalislands.net/greenislands/index.php?region=5&c=60 [Accessed 6/2/12]

Godfray, C., Beddington, J., Crute, I., Haddad, L., Lawrence, D., Muir, J., Pretty, J., Robinson, S., Thomas, S., & Toulmin, C. (2010). Food Security: The Challenge of Feeding 9 Billion People. *Science, 327*(5967), 812-818.

Gold, R. L. (1958). Roles in Sociological Field Observations. *Social Forces*, 217-223.

GoM. (2009). *"Aneh Dhivehi Raajje" The Strategic Action Plan - National Framework for Development 2009-2013. The Government of Maldives*. Retrieved from The Presidents Office, Maldives.

Gowdy, J. (1997). *Limited wants, unlimited means: A reader on hunter-gatherer economics and the environment*. Washington DC, U.S.A.: Island Press.

Guba, E. (1990). *The Paradigm Dialog*. Thousand Oaks CA: Sage.

Guba, E., & Lincoln, Y. (1994). Competing Paradigms in Qualitative Research. *Handbook of qualitative research, 2*, 163-194.

Hadenius, A., & Teorell, J. (2007). Pathways from authoritarianism. *Journal of Democracy, 18*(1), 143-157.

Hammersley, M., & Atkinson, P. (1983). Ethnology: Principles in practice. *New York: Tavistock*.

Headey, D., & Fan, S. (2008). Anatomy of a crisis: The causes and consequences of surging food prices. *Agricultural Economics, 39*(s1), 375-391.

Horne, F., & Mousseau, F. (2011). *Understanding Land Investment Deals in Africa: Country Report, Ethiopia*. Oakland, CA: The Oakland Institute.

Hossain, M. (1998). *Research Report 65. Credit for Alleviation of Rural Poverty: The Grameen Bank in Bangladesh* (ISBN 0-89629-067-0). Retrieved from International Food Policy Research Institute in collaboration with the Bangladesh Institute of Development Studies.

Houghton, J. (1997). *Global warming: the complete briefing*. Cambridge: Cambridge University Press.

Hurst, P., Termine, P., & Karl, M. (2005a). *FAO- ILO-IUF Agricultural Workers and their Contribution to Sustainable Agriculture and Rural Development*. Retrieved from Rome.

Hurst, P., Termine, P., & Karl, M. (2005b). FAO- ILO-IUF Agricultural Workers and their Contribution to Sustainable Agriculture and Rural Development. Available at www.fao-ilo.org/fileadmin/user_upload/fao_ilo/pdf/engl_agricultureC4163.pdf [Accessed: 4/2/15]

Husain, M. (1976). The Rehla Of Ibn Battuta - India, Maldive Islands And Ceylon - Translation and Commentry. *Gaekwads Oriental Series No 122*, part 1. Ch. 16.

IAASTD. (2009). *International Assessment of Agricultural Knowledge, Science and Technology for Development. Executive Summary of the Synthesis Report*. Washington DC: Island Press.

IFAD. (2006). *Post-Tsunami Agricultural and Fisheries Rehabiltation Programme. Appraisal-Implementation Edition* (1915-MV). Retrieved from IFAD, Asia and the Pacific Division Programme Management Department.

IFAD. (2008). *Fisheries and Agricultural Diversification Programme. Appraisal - Implementation Edition* (1990). Retrieved from IFAD, Asia and Pacific Division Programme Management Department.

IFAD. (2010). Rural Poverty Report 2011: New Realities, New Challenges, New Opportunities for Tomorrows Generation. Available at http://www.ifad.org/rpr2011/report/e/print_rpr2011.pdf [Accessed: 22/4/13]

IFAD. (2010a). Climate Change: Building the resilience of poor rural communities. Available at https://www.ifad.org/documents/10180/37cb3c45-560a-495f-b3fc-d454d45139ed [Accessed: 5/10/15]

IFAD. (2013). *Republic of Maldives. Fisheries and Agricultural Diversification Programme IFAD Loan 726-MV. Aide-memoire*. Retrieved from Rome.

IFAD. (2013a). Higher and volatile food prices and poor rural people. Available at https://www.ifad.org/documents/10180/37cb3c45-560a-495f-b3fc-d454d45139ed [Accessed: 16/4/14]

IFAD. (2017). *Republic of Maldives. Post Tsunami Agriculture and Fisheries Rehabilitation Programme.Programme performance evaluation*. Retrieved from Rome.

IRIN Global News. (2009). Twelve countries on the climate change hit list. Available at http://www.irinnews.org/Report/85179/GLOBAL-Twelve-countries-on-climate-change-hit-list [Accessed 5/11/12]

Ivanic, M., Martin, W., & Zaman, H. (2012). Estimating the Short-Run Poverty Impacts of the 2010-11 Surge in Food Prices. *World Development, 40*(11), 2302-2317.

Jodha, N. (1990). *Rural Common Property Resources: A Growing Crisis*. Retrieved from International Institute for Environment and Development, London. Gatekeeper Series No. 24.

Jomo, K., & Fine, B. (Eds.). (2005). *The New Development Economics: After the Washington Consensus*: Zed Books

Jongwanich, J. (2009). The impact of food safety standards on processed food exports from developing countries. *Food Policy, 34*(5), 447-457.

Joshi, S., Kochhar, N., & Rao, V. (2017). *Are caste categories misleading? The relationship between gender and jati in three Indian states. Working Paper 2017/132* Retrieved from United Nations University World Institute for Development Economics Research.

Kaplinsky, R., & Morris, M. (2001). *A handbook for value chain research* (Vol. 113). Ottawa: International Development Research Centre

Kelly, V., Adesina, A., & Gordon, A. (2003). Expanding access to agricultural inputs in Africa: a review of recent market development experience. *Food Policy, 28*(4), 379-404.

Kench, P., Parnell, K., & Brander, R. (2003). *A process based assessment of engineered structures on reef islands of the Maldives.* Paper presented at the Coasts & Ports 2003 Australasian Conference: Proceedings of the 16th Australasian Coastal and Ocean Engineering Conference, the 9th Australasian Port and Harbour Conference and the Annual New Zealand Coastal Society Conference, Auckland.

Khaleel, M., & Saeed, S. (1996). *Paper 8: Environmental Changes in the Maldives: Current Issues for Management* Retrieved from Ministry of Planning Human Resources and Environment, Maldives.

Khan, T., Quadir, D., Murty, T., Kabir, A., Aktar, F., & Sarker, M. (2002). Relative sea level changes in Maldives and vulnerability of land due to abnormal coastal inundation. *Marine Geodesy, 25*(1-2), 133-143.

Khandker, S. (1996). Grameen Bank: Impact, costs, and program sustainability. *Asian Development Review, 14*, 97-130.

Krueger, R. (2008). *Focus groups: A practical guide for applied research (4th Ed.)*. Thousand Oaks, CA: Sage.

Lal, R. (2004). Soil carbon sequestration impacts on global climate change and food security. *science, 304*(5677), 1623-1627.

Le Quéré, C. (2010). Trends in the land and ocean carbon uptake. *Current Opinion in Environmental Sustainability, 2*(4), 219-224.

Lee, R., & Daly, R. (1999). *The Cambridge encyclopedia of hunters and gatherers*. Cambridge: Cambridge University Press.

Liamputtong, P. (2010). *Performing qualitative cross-cultural research*. Cambridge: Cambridge University Press.

Liebregts, W. (2007). *Agriculture in an Atoll Environment*. Male': Ministry of Fisheries and Agriculture.

Lincoln, Y., & Guba, E. (1985). *Naturalistic inquiry*. Thousand Oaks, CA: Sage.

Live and Learn. (2015). Live and Learn Environmental Education - Virgin Coconut Oil. Available at http://www.livelearn.org/projects/virgin-coconut-oil [Accessed: 17/9/2016]

Lowenthal, D. (1987). Social features. In *C.Clarke & T Payne (Eds.) Politics, security, and development in small states.* (pp. 26-49). London: Allen & Unwin.

Lubna, H. (2012). Planning Statistics Show Surge In Unhealthy Eating. *Minivan News*. Available at https://minivannewsarchive.com/politics/planning-statistics-show-surge-in-unhealthy-eating-37571 [Accessed: 23/1/13]

Macnaghten, P., & Myers, G. (2004). Focus Groups. In C. Seale, G. Gobo, J. F. Gubrium & D. Silverman (Eds.). *Qualitative research practice*, (65-79).

Maldives Customs Services. (2017). *Food Flows to the Maldives*. Retrieved from Maldives Customs Services, Male'.

Maloney, C. (1980). *People of the Maldive Islands*. Madras: Orient Longman.

Matson, P., Parton, W., Power, A., & Swift, M. (1997). Agricultural intensification and ecosystem properties. *Science, 277*(5325), 504-509.

McCarthy, J., Canziani, O., Leary, N., Dokken, D., & White, K. (2001). *Climate change 2001: impacts, adaptation, and vulnerability* New York N.Y.: Cambridge University Press.

McDonough, J., & McDonough, S. (2014). *Research methods for English language teachers*. Abingdon, Oxon.: Routledge.

McIntosh, A. (1990). Rethinking chieftaincy and the future of rural local government: a preliminary investigation. *Transformation: Critical Perspectives on Southern Africa*(13), 27-45.

Meadows, D., Meadows, D., Randers, J., & Behrens, W. (1972). *The limits to growth*. New York N.Y.: Universe Books.

Merriam, S. (2009). *Qualitative research: A guide to design and implementation*. San Francisco, CA: John Wiley & Sons.

Miles, M., & Huberman, M. (1994). *Qualitative data analysis: An expanded sourcebook*. Thousand Oaks, CA: Sage.

Ministry of Economic Development. (2013). *Maldives Economic Diversification Strategy*. Retrieved from Ministry of Economic Development, Male'.

Ministry of Environment and Energy. (2015). *Maldives National Chemical Profile*. Retrieved from Ministry of Environment and Energy, Male'.

Ministry of Health. (2007). *National Micronutrient Survey 2007 Maldives*. Retrieved from Ministry of Health / UNICEF, Male'.

Ministry of Home Affairs Housing and Envrionment. (2001). *First National Communications to the United Nations Framework Convention on Climate Change (UNFCCC), Male', Maldives*. Retrieved from Ministry of Home Affairs, Housing and Envrionment, Male'.

Ministry of Housing Transport and Environment. (2009). *National Adaptation to Climate Change. A background paper prepared for the Maldives Partnership Forum, 2009*. Retrieved from Ministry of Housing Transport and Environment, Male'.

Ministry of Housing Transport and Environment. (2009a). *Third National Environmental Action Plan (2009-2013)*. Retrieved from Ministry of Housing Transport and Environment, Male'.

Ministry of Planning and National Development. (2007). *Seventh National Development Plan 2006-2010. Creating New Opportunities*. Retrieved from Ministry of Planning and National Development, Male'.

Mitchell, J., & Coles, C. (Eds.). (2011). *Markets and rural poverty: upgrading in value chains*. Abingdon, Oxon.: Earthscan.

MoFA. (2010). *Agricultural Development Master Plan Maldives (2010-2025)* (Vol. 1 and 2.). Retrieved from Ministry of Fisheries and Agriculture, Male'.

Mörner, N. (2004). The Maldives project: a future free from sea-level flooding. *Contemporary South Asia, 13*(2), 149-155.

Naik, G., Basavarajappa, K., Hegde, V., Paidi, V., & Subramanian, A. (2012). Reliability of agricultural statistics in developing countries: reflections from a comprehensive village survey on crop area statistics in India. *Indian Institute of Management Bangalore* (Working Paper 381).

Narrod, C., Roy, D., Okello, J., Avendaño, B., Rich, K., & Thorat, A. (2009). Public–private partnerships and collective action in high value fruit and vegetable supply chains. *Food Policy, 34*(1), 8-15.

Naseer, A., & Hatcher, B. (2004). Inventory Of The Maldives' Coral Reefs Using Morphometrics Generated From Landsat Etm+ Imagery. *Coral Reefs, 23*(1), 161-168.

National Bureau of Statistics. (2017). *Statistical Yearbook of Maldives 2017.* Retrieved from National Bureau of Statistics, Male'.

Niroula, G., & Thapa, G. (2005). Impacts and causes of land fragmentation, and lessons learned from land consolidation in South Asia. *Land Use Policy, 22*(4), 358-372.

Njenga, A. (2009). *Mobile phone banking: usage experiences in Kenya.* (MBA), Catholic University of Eastern Africa, Unpublished MBA thesis of Catholic University of Eastern Africa.

Padgett, D. (1998). *Qualitative methods in social work research: challenges and rewards.* (Vol. 43). Thousand Oaks, CA: Sage.

Parliamentary Office of Science and Technology. (2006). Food Security in Developing Countries. Available at http://www.parliament.uk/documents/post/postpn274.pdf [Accessed: 30/7/08]

Patton, M. (2002). *Qualitative research and evaluation methods (3rd Edition)*. Thousand Oaks, CA: Sage.

Pearse, A. (1980). Seeds of Plenty, Seeds of Want: Social and Economic Implications of the Green Revolution. *Revisiting Sustainable Development, 139*.

Peck, C., Pearce, D., Rubio, F., Acevedo, J., Brar, A., Ayee, G., de Vletter, F., & Reinsch, M. (2005). *Managing risks and designing products for agricultural microfinance: features of an emerging model*. Washington DC: The World Bank.

Pernetta, J. (1992). Impacts of climate change and sea-level rise on small island states: national and international responses. *Global Environmental Change, 2*(1), 19-31.

Petersen, W. (1999). *Malthus: Founder of Modern Demography*. New Brunswick, New Jersey: Transaction Publishers.

Pimentel, D. (1996). Green revolution agriculture and chemical hazards. *Science of the Total Environment, 188*, S86-S98.

Platteau, J. (1996). The evolutionary theory of land rights as applied to sub-Saharan Africa: a critical assessment. *Development and Change, 27*(1), 29-86.

Poonyth, D., & Ford, D. (2005). *FAO Commodities and Trade Technical Paper 7. Small Island Developing States. Agricultural Prodcution and Trade, Preferences and Policy*. Retrieved from FAO, Rome.

Pretty, J. (2008). Agricultural sustainability: concepts, principles and evidence. *Philosophical Transactions of the Royal Society B: Biological Sciences, 363*(1491), 447-465.

Pretty, J., & Koohafkan, P. (2002). *Land and agriculture: from UNCED, Rio de Janeiro 1992, to the World Summit on Sustainable Development, Johannesburg 2002*. Rome: FAO.

Pretty, J., Morison, J., & Hine, R. (2003). Reducing food poverty by increasing agricultural sustainability in developing countries. *Agriculture, Ecosystems & Environment, 95*(1), 217-234.

Raleigh, C., Jordan, L., & Salehyan, I. (2008). Assessing the impact of climate change on migration and conflict. In *Paper commissioned by the World Bank Group for the Social Dimensions of Climate Change workshop, Washington, DC* (pp. 5-6).

Rapsomanikis, G. (2015). *The economic lives of smallholder farmers. An analysis based on data from nine household countries*. Rome: FAO.

Readshaw, J. (1994). *An Evaluation of Coastal Engineering Issues and Requirements in the Republic of Maldives*. Male' Hatfield Consultants Limited.

Renard, M. (2003). Fair trade: quality, market and conventions. *Journal of Rural Studies, 19*(1), 87-96.

Rockström, J., Lannerstad, M., & Falkenmark, M. (2007). Assessing the water challenge of a new green revolution in developing countries. *Proceedings of the National Academy of Sciences, 104*(15), 6253-6260.

Romero-Frias, X. (1999). *The Maldive Islanders: A Study of the Popular Culture of an Ancient Ocean Kingdom*. Barcelona: Nova Ethnographica Indica.

Rosegrant, M. (2008). *Biofuels and grain prices: impacts and policy responses*. Washington DC: International Food Policy Research Institute.

Ruttan, V. (2000). The Continuing Challenge of Food Production: Food in the 21st Century: From Science to Sustainable Agriculture. *Environment: Science and Policy for Sustainable Development, 42*(10), 25-30.

Schaller, N. (1993). The concept of agricultural sustainability. *Agriculture, Ecosystems & Environment, 46*(1), 89-97.

Sedjo, R., & Sohngen, B. (2012). Carbon sequestration in forests and soils. *Annual Review of Resource Economics, 4*(1), 127-144.

Seidman, I. (1991). *Interviewing as qualitative research: A guide for research in education and the social studies*. New York: Teachers College Press.

Sen, A. (2000). *Social exclusion: concept, application, and scrutiny. Social Development Papers No. 1*. Manila: Asian Development Bank.

Shaig, A. (2006). *Climate Change Vulnerability and Adaptation Assessment of the Land and Beaches of Maldives.* (Paper), James Cook University, Townsville, Australia

Shareef, A. (2010). *Fourth National Report to the Convention on Biological Diversity Maldives*. Retrieved from Ministry of Housing and Environment, Male'.

Singh, I., Squire, L., & Strauss, J. (1986). *Agricultural household models: Extensions, applications, and policy*. Washington DC: The World Bank.

Smith, L., El Obeid, A., & Jensen, H. (2000). The geography and causes of food insecurity in developing countries. *Agricultural Economics, 22*(2), 199-215.

Smith, P., Martino, D., Cai, Z., Gwary, D., Janzen, H., Kumar, P., McCarl, B., Ogle, S., O'Mara, F., & Rice, C. (2008). Greenhouse gas mitigation in agriculture. *Philosophical Transactions of the Royal Society B: Biological Sciences, 363*(1492), 789-813.

Srebrnik, H. (2004). Small island nations and democratic values. *World Development, 32*(2), 329-341.

Stake, R. (1995). *The art of case study research*. Thousand Oaks, CA: Sage.

Stake, R. (2005). Qualitative case studies In *N Denzin and Y Lincoln (Eds.), The Sage handbook of qualitative research*. Thousand Oaks, CA: Sage

Steinfeld, H., Gerber, P., Wassenaar, T., Castel, V., & de Haan, C. (2006). *Livestock's long shadow: environmental issues and options*. Rome: FAO.

Steinfeld, H., Wassenaar, T., & Jutzi, S. (2006). Livestock production systems in developing countries: status, drivers, trends. *Revue scientiffique et techque. Office International des Epizooties, 25*(2), 505-516.

Stewart, D., Shamdasani, P., & D, R. (2006). *Focus groups: Theory and practice (2nd Ed.)*. Thousand Oaks, CA: Sage.

Sturton, M. (1992). *Tonga: development through agricultural exports. Economic report no. 4*. Honolulu, Hawaii: Pacific Islands Development Programme.

Sutton, M., Reis, S., Billen, G., Cellier, P., Erisman, J., Mosier, A., Nemitz, E., Sprent, J., Van Grinsven, H., & Voss, M. (2012). Nitrogen and Global Change-Preface. *Biogeosciences, 9*(5), 1691-1693.

Tanji, K., & Wallender, W. (Eds.). (2011). *Agricultural salinity assessment and management (2nd Edition) Manual No. 71*. Reston, VA: American Society of Civil Engineers

Taylor, S., & Bogdan, R. (1984). *Introduction to qualitative research methods (2nd Edition)*. New York, N.Y.: Wiley.

Tol, R. (2007). The double trade-off between adaptation and mitigation for sea level rise: an application of FUND. *Mitigation and Adaptation Strategies for Global Change, 12*(5), 741-753.

Trewin, R. (2004). Cooperatives: Issues and trends in developing countries: Report of a workshop held in Perth, 24-25 March 2003. *Australian Centre for International Agrcultural Research* (Technical Report No. 53).

UN Documents. (1994). *Programme of Action for the Sustainable Development of Small Island Developing States*. Paper presented at the Global Conference on the Sustainable Development of Small Island Developing States, Barbados. Available at: http://www.un-documents.net/sids-act.htm [Accessed: 18.4.14]

UN Press Room. (2013). We can end poverty. Mellenium Developement Goals and beyond 2015. Available at http://www.un.org/millenniumgoals/bkgd.shtml [Accessed: 11/3/16]

UN-OHRLLS. (2013). *State of the Least Developed Countries 2013. Follow up of the implementation of the Istanbul Programme of Action for the Least Developed Countries.* Retrieved from United Nations Office of the HIgh Representative for the least developed countries, landlocked developing countries, small island developing states (UN-OHRLLS). New York.

UNDP. (2006). Human Development Report 2006. Beyond scarcity: Power, poverty and the global water crisis. Available at http://www.undp.org/content/undp/en/home/librarypage/hdr/human-development-report-2006/ [Accessed: 23/3/14]

UNDP. (2013). Support to Integrated Farming. *Policy and Inclusive Growth - UNDP Maldives*. Available at http://www.undp.org/content/dam/maldives/docs/Policy%20and%20Inclusive%20Growth/Project%20Factsheets/Project%20Factsheet_Integrated%20Farming.pdf [Accessed: 18/7/17]

UNDP. (2014). Maldives human development report 2014. Bridging the divide: Addressing vulnerability, reducing inequality. Available at http://hdr.undp.org/sites/default/files/maldives_hdr2014_full_report_0.pdf [Accessed:2/6/16]

UNDP Maldives. (2016). Low Emission Climate Resiliant Development. Availabe at http://www.un.org.mv/lecred/ [Accessed: 5/12/16]

UNFCCC. (2005). Cimate Change. Small Island Developing States. Available at http://unfccc.int/resource/docs/publications/cc_sids.pdf [Accessed: 25/8/14]

UNICEF. (2007). Maldives. Young child survival and development. Available at http://www.unicef.org/maldives/survival_development.html [Accessed 1/10/12]

UNICEF. (2008). State of the Worlds Children 2009. Maternal and Newborn Health. 164. Available at http://www.unicef.org/sowc09/docs/SOWC09-FullReport-EN.pdf [Accessed 16/8/12]

United Nations Department for Economic and Social Affairs. (2004). Agenda 21: Chapter 14. Promoting Sustainable Agriculture and Rural Development. Available at http://webapp1.dlib.indiana.edu/virtual_disk_library/index.cgi/4294132/FID2641/DATA/AG21E.PDF [11/4/14]

University of California Davis. (2017). What is sustainable agriculture. Available at http://asi.ucdavis.edu/programs/sarep/about/what-is-sustainable-agriculture [Accessed 14/12/17]

Van der Velde, M., Green, S., Vanclooster, M., & Clothier, B. (2006). Sustainable development in small island developing states: Agricultural intensification, economic development, and freshwater resources management on the coral atoll of Tongatapu. *Ecological Economics, 61*(2), 456-468.

Van Menen, M. (1990). *Researching lived experience (2nd Edition): Human science for an action sensitive pedagogy*. Abingdon, Oxon: Routledge.

Waheed, M. (2012). His Excellency Dr Mohamed Waheed's Inaugural Address at The opening ceremony of the 2nd annual AGPA (Asian Group for Public Administration) Conference, 2012. Ref: PRO/RMW/2012/74. Available at http://www.presidencymaldives.gov.mv/?lid=12&dcid=7371 [Accessed 1/2/13]

Whitehead, A., & Tsikata, D. (2003). Policy discourses on women's land rights in Sub–Saharan Africa: The implications of the re–turn to the Customary. *Journal of Agrarian Change, 3*(1-2), 67-112.

Wiggins, S., & Brooks, J. (2010). *The use of input subsidies in developing countries.* Paper presented at the Global Forum on Agriculture - Policies for agricultural development, poverty reduction, and food security. Paper ref: TAD/CA/APM/WP(2010)45., The Organisation for Economic Cooperation and Development, Paris.

Wittig, V. (2011). *Low emission climate resilient development program for Laamu Atoll, Maldives: agriculture sector interventions*. Retrieved from Ministry of Fisheries and Agriculture, Male'.

Wittig, V. (2012). *Low emission climate resilant development. Thematic area: agriculture.* Paper presented at the Low emission climate resilant development inception workshop Male', Maldives.

Woodroffe, C. (2008). Reef-island topography and the vulnerability of atolls to sea-level rise. *Global and Planetary Change, 62*(1), 77-96.

Woodworth, P. (2005). Have there been large recent sea level changes in the Maldive Islands? *Global and Planetary Change, 49*(1), 1-18.

World Bank. (2006). Toxic pollution from agriculture: an emerging story. Available at http://go.worldbank.org/9TLA5X2DY0 [Accessed: 16/5/14]

World Bank. (2007). *World Development Report 2008: Agriculture for development*. Washington DC: World Bank.

World Bank. (2011). Agriculture in South Asia. Maldives: priorities for agriculture and rural development. Available at http://go.worldbank.org/H096QOJ4G0 [Accessed: 2/10/12]

World Bank. (2011a). High and volatile food prices continue to threaten the worlds poor. *Press Release No. 2011/430/PREM*. Available at http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,,contentMDK:22888645~pagePK:64257043~piPK:437376~theSitePK:4607,00.html [Accessed 24/9/12]

World Bank. (2011b). *Maldives Economic Update September 2011*. Retrieved from World Bank, Washington DC.

World Bank. (2011c). World Development Indicators. *National accounts data*. Available at http://data.worldbank.org [Accessed 11/11/12]

World Bank. (2012). BioCarbon Fund Experience: insights from afforestation / reforestation clean development mechanism projects. Available at http://documents.worldbank.org/curated/en/327231468336659605/BioCarbon-fund-experience-insights-from-afforestation-and-reforestation-clean-development-mechanism-projects [Accessed: 29/3/14]

World Bank. (2013). *T*he Maldives: A development success story. Available at http://www.worldbank.org/en/results/2013/04/10/maldives-development-success-story [Accessed: 17/3/15]

World Bank. (2017). The World Bank in Maldives. Overveiw. Available at http://www.worldbank.org/en/country/maldives [Accessed: 1/2/18]

World Travel and Tourism Council. (2017). Travel and Tourism Economic Impact 2017 Maldives. Available at https://www.wttc.org/-/media/files/reports/economic-impact-research/countries-2017/maldives2017.pdf [Accessed 6/11/17]

Worrell, D. (1992). Economic policies in small open economies: prospects for the Caribbean. *Vol. 23 of Economic Paper Series*(Issue 23 of Commonwealth economic papers).

WTO. (2009). Trade policy review. Report to the Secretariat. Maldives. Report ref: WT/TPR/S/221. Available at https://www.wto.org/english/tratop_e/tpr_e/s221-00_e.doc [Accessed: 13/4/15]

Young, A. (1994). *Land degradation in South Asia: Its severity, causes, and effects upon the people. World soil resources reports.* Rome: FAO.

Young, A. (1999). Is there really spare land? A critique of estimates of available cultivable land in developing countries. *Environment, Development and Sustainability, 1*(1), 3-18.

# Appendices

## Appendix 1. Maldivian agricultural production traded through the Male' market 2016.

**AGRICULTURAL PRODUCTS PRODUCED IN THE MALDIVES AND TRADED IN THE MALE' MARKET BY ATOLLS 2016**

**(In Kg)**

| | Total | Production by Atolls: | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | HA | HDh | Sh | N | R | B | Lh | K | AA | ADh | V | M | F | Dh | Th | L | GA | GDh | Gn | S |
| **Total** | **4,716,949** | **117,900** | **9,848** | **369,371** | **8,062** | **145** | **27,658** | **0** | **1,051,096** | **1,478,217** | **2,468** | **0** | **24,931** | **6,513** | **0** | **120,322** | **877,570** | **68,040** | **82,473** | **408,768** | **64,167** |
| Watermelon | **437,685** | 1,500 | 48 | 52,594 | - | - | 5,150 | - | 57,100 | 152,200 | - | - | - | 800 | - | 12,743 | 150,750 | 1,460 | 3,350 | - | - |
| Coconut Hycoung | **1,600,833** | 77,790 | 3,690 | 142,740 | 5,688 | - | 9,900 | - | 338,550 | 136,020 | - | - | 16,263 | 3,072 | - | 45,870 | 439,200 | 35,100 | 44,550 | 256,500 | 45,900 |
| Papayas | **571,283** | - | 125 | 195 | - | - | - | - | 45,200 | 525,330 | - | - | 40 | - | - | - | 303 | - | - | - | - |
| Pumpkin | **142,639** | 3,054 | - | 17,325 | - | | 2,900 | - | 34,887 | 49,725 | - | - | 1,000 | - | - | 325 | 32,573 | 300 | 350 | 200 | |
| Cucumber | **126,990** | - | - | 14,485 | - | - | 1,700 | - | 16,925 | 88,475 | 1,146 | - | 225 | 30 | - | 560 | 3,044 | 100 | 300 | - | |
| Banana | **589,280** | 10,120 | 675 | 59,700 | 1,290 | 120 | 600 | - | 300,685 | 12,825 | - | - | 1,200 | 540 | - | 4,560 | 111,480 | 9,135 | 10,575 | 55,200 | 10,575 |
| Betgel | **127,885** | 500 | - | 17,055 | 50 | - | 1,850 | - | 37,790 | 61,300 | 1,070 | - | 200 | 435 | - | 500 | 6,785 | 50 | 300 | - | |
| Coconut | **269,291** | 23,387 | 5,100 | 18,868 | 900 | - | 1,350 | - | 14,575 | 7,262 | 250 | - | 5,381 | 125 | - | 34,258 | 79,422 | 18,675 | 18,731 | 36,687 | 4,320 |
| chillies | **74,421** | 130 | - | 2,018 | 20 | - | 60 | - | 8,315 | 3,866 | - | - | 85 | 90 | - | 18,669 | 41,658 | 10 | - | - | |
| Bottle gourd | **24,920** | - | - | - | - | - | - | - | 7,750 | 17,140 | - | - | - | - | - | - | 30 | - | - | - | |
| Butternut | **21,670** | 200 | - | 8,100 | - | - | 3,000 | - | 1,650 | 4,900 | - | - | - | - | - | 1,820 | 1,820 | 180 | - | - | |
| Chinese Cabbag | **75,985** | - | - | - | - | - | - | - | 14,730 | 60,990 | - | - | - | - | - | - | 185 | 80 | - | - | |
| Mango | **47,684** | - | - | 1,392 | - | - | - | - | 1,200 | 2,107 | - | - | 335 | - | - | - | 2,658 | 119 | 324 | 38,233 | 1,816 |
| Wax gourd | **67,679** | - | - | 800 | - | - | - | - | 31,395 | 35,384 | - | - | - | - | - | - | 100 | | - | - | |
| Betel leaves | **43,568** | - | - | - | - | - | - | - | - | 43,568 | - | - | - | - | - | - | - | | - | - | |
| Others | **495,136** | 1,219 | 210 | 34,099 | 114 | 25 | 548 | - | 140,174 | 277,625 | 2 | - | 202 | 1,421 | - | 1,017 | 8,162 | 2,841 | 3,993 | 21,948 | 1,536 |

Atoll abbreviations: HA-HeliAlifu; ADh-Haa Dhaalu; Sh-Shaviyani; N-Noonu; R-Raa; B-Baa; Lh-Lhaviyani; K-Kaafu; AA-Alifu Alifu; ADh-Alifu Dhaalu; V-Vaavu; M-Meemu; F-Faafu; Dh-Dhaalu; Th-Thaa; L-Laamu; GA-Gaaf Alifu; GDh-Gaaf Dhaalu; Gn-Gnaviyani; S-Seenu.

Source: Agriculture Data Management Unit. Ministry of Fisheries and Agriculture. 2018.

## Appendix 2. Imports of agricultural crops into the Maldives 2016.

**IMPORTS OF AGRICULTURAL CROPS INTO THE MALDIVES, 2016.**
**(The crops listed in this table are also produced in the Maldives)**
**(In kgs)**

| Agricultural Crops | Total | India | Srilanka | U.A.E | Australia | Thailand | Other Countries |
|---|---|---|---|---|---|---|---|
| **Total** | **19,432,048** | **13,471,912** | **2,428,957** | **1,064,280** | **321,712** | **763,669** | **1,381,517** |
| Banana & Plaintain (Fresh) | **1,923,305** | 1,592,962 | 177,710 | 48,658 | 1,885 | 7,546 | 94,544 |
| Beans, Fresh Or Chilled | **611,639** | 371,655 | 151,834 | 33,847 | 6,529 | 19,167 | 28,607 |
| Bitter Gourd ( Fresh Or Chilled ) | **152,980** | 50,002 | 85,802 | 5,587 | 12 | 789 | 10,787 |
| Bottle Gourd ( Fresh Or Chilled ) | **26,294** | 13,190 | 10,167 | 1,605 | 5 | 248 | 1,078 |
| Bread Fruit ( Fresh Or Chilled) | **6,268** | 66 | 4,748 | 856 | 26 | 112 | 460 |
| Cabbage ( Fresh Or Chilled ) | **6,151,309** | 5,541,300 | 279,232 | 87,730 | 28,768 | 11,906 | 202,374 |
| Cabbage Lettuce, Fresh or Chilled | **39,614** | 1,227 | 7,388 | 8,809 | 2,063 | 12,953 | 7,175 |
| Cassava & Manioc ( Fresh , Chilled Or Frozen ) | **173,959** | 5,819 | 155,363 | 4,851 | 5 | 37 | 7,885 |
| Chillies ( Fresh Or Chilled ) | **384,110** | 189,283 | 94,691 | 28,233 | 209 | 17,775 | 53,919 |
| Cucumber ( Fresh Or Chilled ) | **710,433** | 76,053 | 389,936 | 137,765 | 12,233 | 6,847 | 87,599 |
| Drumstick ( Fresh Or Chilled ) | **105,979** | 79,487 | 21,509 | 3,902 | 61 | 169 | 851 |
| Guava ( Fresh Or Dried ) | **331,250** | 69,651 | 98,023 | 20,459 | 112 | 82,167 | 60,838 |
| Lettuce, Fresh Or Chilled. (Excl. Cabbage Lettuce) | **537,739** | 35,426 | 52,566 | 234,813 | 78,879 | 39,865 | 96,190 |
| Mango ( Fresh Or Dried ) | **861,508** | 139,514 | 130,572 | 79,580 | 9,161 | 259,980 | 242,701 |
| Melons, Fresh. (Excl.Watermelons) | **758,594** | 150,307 | 63,033 | 244,399 | 66,082 | 104,207 | 130,567 |
| Papaws (Papayas), Fresh | **157,898** | 3,248 | 111,962 | 7,170 | 30 | 24,406 | 11,082 |
| Passion Fruit ( Fresh Or Dried ) | **277,565** | 6,702 | 195,215 | 24,994 | 1,042 | 18,366 | 31,245 |
| Pumpkin (Fresh Or Chilled) | **1,811,130** | 1,671,481 | 93,558 | 16,027 | 13,396 | 1,051 | 15,618 |
| Sapodilla (Fresh) | **8,526** | 974 | 261 | 3,544 | 32 | 3,374 | 342 |
| Snake Gourd ( Fresh Or Chilled ) | **41,641** | 5,793 | 32,508 | 995 | 7 | 142 | 2,196 |
| Sweet Potato ( Fresh , Chilled Or Frozen ) | **1,499,636** | 1,089,774 | 158,679 | 17,727 | 10,335 | 2,039 | 221,083 |
| Watermelons, Fresh | **2,860,671** | 2,377,999 | 114,200 | 52,731 | 90,841 | 150,524 | 74,376 |

*Source: Maldives Customs Service, 2016.*

# Appendix 3. Imports of farming inputs into the Maldives 2016.

**IMPORTS OF FARMING INPUTS INTO THE MALDIVES. 2016.**

**KEY: KG - KILOGRAM; LTR - LITRE; NMB - NUMBER; NES - NOT ELSEWHERE SPECIFIED, meaning there is no specific coding.**

| DESCRIPTION | UNIT | COUNTRY OF CONSIGNMENT | QUANTITY |
|---|---|---|---|
| SUGAR BEET SEED, OF A KIND USED FOR SOWING | KG | AUSTRALIA | 870.00 |
| SUGAR BEET SEED, OF A KIND USED FOR SOWING | KG | GERMANY | 2.00 |
| SUGAR BEET SEED, OF A KIND USED FOR SOWING | KG | MAURITIUS | 20,350.00 |
| SUGAR BEET SEED, OF A KIND USED FOR SOWING | KG | SRI LANKA | 210.00 |
| SUGAR BEET SEED, OF A KIND USED FOR SOWING | KG | UNITED ARAB EMIRATES | 1,233.43 |
| LUCERNE (ALFALFA) SEEDS, OF A KIND USED FOR SOWING | KG | AUSTRALIA | 3.92 |
| LUCERNE (ALFALFA) SEEDS, OF A KIND USED FOR SOWING | KG | FRANCE | 0.80 |
| LUCERNE (ALFALFA) SEEDS, OF A KIND USED FOR SOWING | KG | GERMANY | 1.60 |
| LUCERNE (ALFALFA) SEEDS, OF A KIND USED FOR SOWING | KG | SRI LANKA | 1.60 |
| LUCERNE (ALFALFA) SEEDS, OF A KIND USED FOR SOWING | KG | THAILAND | 10.00 |
| LUCERNE (ALFALFA) SEEDS, OF A KIND USED FOR SOWING | KG | UNITED ARAB EMIRATES | 22.60 |
| CLOVER SEED, OF A KIND USED FOR SOWING | KG | SRI LANKA | 690.00 |
| CLOVER SEED, OF A KIND USED FOR SOWING | KG | UNITED ARAB EMIRATES | 57.00 |
| RYE GRASS SEEDS, OF A KIND USED FOR SOWING | KG | AUSTRALIA | 53.20 |
| RYE GRASS SEEDS, OF A KIND USED FOR SOWING | KG | CHINA | 50.00 |
| RYE GRASS SEEDS, OF A KIND USED FOR SOWING | KG | SINGAPORE | 1.00 |
| SEEDS OF FORAGE PLANTS, OF A KIND USED FOR SOWING, NES | KG | INDIA | 4,601.00 |
| SEEDS OF FORAGE PLANTS, OF A KIND USED FOR SOWING, NES | KG | SRI LANKA | 60.00 |
| SEEDS OF FORAGE PLANTS, OF A KIND USED FOR SOWING, NES | KG | UNITED ARAB EMIRATES | 1.00 |
| SEEDS OF HERBACEOUS PLANTS, OF A KIND USED FOR SOWING | KG | THAILAND | 2.00 |
| SEEDS OF HERBACEOUS PLANTS, OF A KIND USED FOR SOWING | KG | UNITED STATES | 3.00 |
| VEGETABLE SEEDS (SOWING) | KG | AUSTRALIA | 69.20 |
| VEGETABLE SEEDS (SOWING) | KG | CHINA | 50.00 |
| VEGETABLE SEEDS (SOWING) | KG | GERMANY | 3.00 |
| VEGETABLE SEEDS (SOWING) | KG | GREAT BRITAIN | 13.00 |
| VEGETABLE SEEDS (SOWING) | KG | NETHERLANDS | 578.00 |
| VEGETABLE SEEDS (SOWING) | KG | NEW TAIWAN | 13.04 |
| VEGETABLE SEEDS (SOWING) | KG | SINGAPORE | 252.95 |
| VEGETABLE SEEDS (SOWING) | KG | SRI LANKA | 31.40 |
| VEGETABLE SEEDS (SOWING) | KG | THAILAND | 1,199.39 |
| VEGETABLE SEEDS (SOWING) | KG | UNITED ARAB EMIRATES | 202.65 |
| VEGETABLE SEEDS (SOWING) | KG | UNITED STATES | 393.63 |
| CASACAS (ISBAGULU) (BIFAL AND CHIA SEED) | KG | INDIA | 1,685.40 |
| CASACAS (ISBAGULU) | KG | SRI LANKA | 265.00 |
| CASACAS (ISBAGULU) | KG | THAILAND | 260.00 |
| CASACAS (ISBAGULU) | KG | UNITED ARAB EMIRATES | 399.20 |
| OTHER SEEDS,FRUITS AND SPORES OF A KIND USED FOR SOWING, NES. | KG | AUSTRALIA | 178.37 |
| OTHER SEEDS,FRUITS AND SPORES OF A KIND USED FOR SOWING, NES. | KG | CHINA | 61,604.00 |
| OTHER SEEDS,FRUITS AND SPORES OF A KIND USED FOR SOWING, NES. | KG | ECUADOR | 50.00 |
| OTHER SEEDS,FRUITS AND SPORES OF A KIND USED FOR SOWING, NES. | KG | FRANCE | 502.00 |
| OTHER SEEDS,FRUITS AND SPORES OF A KIND USED FOR SOWING, NES. | KG | GERMANY | 1,036.00 |
| OTHER SEEDS,FRUITS AND SPORES OF A KIND USED FOR SOWING, NES. | KG | INDIA | 205.00 |
| OTHER SEEDS,FRUITS AND SPORES OF A KIND USED FOR SOWING, NES. | KG | ITALY | 14.04 |
| OTHER SEEDS,FRUITS AND SPORES OF A KIND USED FOR SOWING, NES. | KG | JAPAN | 920.00 |
| OTHER SEEDS,FRUITS AND SPORES OF A KIND USED FOR SOWING, NES. | KG | MALAYSIA | 6.54 |
| OTHER SEEDS,FRUITS AND SPORES OF A KIND USED FOR SOWING, NES. | KG | NETHERLANDS | 46.82 |
| OTHER SEEDS,FRUITS AND SPORES OF A KIND USED FOR SOWING, NES. | KG | NEW TAIWAN | 216.32 |
| OTHER SEEDS,FRUITS AND SPORES OF A KIND USED FOR SOWING, NES. | KG | PAKISTAN | 6.00 |
| OTHER SEEDS,FRUITS AND SPORES OF A KIND USED FOR SOWING, NES. | KG | SINGAPORE | 123.51 |
| OTHER SEEDS,FRUITS AND SPORES OF A KIND USED FOR SOWING, NES. | KG | SRI LANKA | 1,046.67 |
| OTHER SEEDS,FRUITS AND SPORES OF A KIND USED FOR SOWING, NES. | KG | THAILAND | 951.14 |
| OTHER SEEDS,FRUITS AND SPORES OF A KIND USED FOR SOWING, NES. | KG | UKRAINE | 0.06 |
| OTHER SEEDS,FRUITS AND SPORES OF A KIND USED FOR SOWING, NES. | KG | UNITED ARAB EMIRATES | 2,829.15 |
| OTHER SEEDS,FRUITS AND SPORES OF A KIND USED FOR SOWING, NES. | KG | UNITED STATES | 14.23 |
| COIR DUST | KG | GERMANY | 172.00 |
| COIR DUST | KG | INDIA | 239,819.63 |
| COIR DUST | KG | KOREAN REPUBLIC OF | 90.06 |
| COIR DUST | KG | MALAYSIA | 375.00 |
| COIR DUST | KG | SRI LANKA | 143,385.41 |
| COIR DUST | KG | THAILAND | 10,095.00 |
| COIR DUST | KG | UNITED ARAB EMIRATES | 57.10 |
| COW DUNG | KG | GERMANY | 45.00 |
| COW DUNG | KG | INDIA | 7,935,915.00 |
| COW DUNG | KG | SINGAPORE | 20,000.00 |
| COW DUNG | KG | SRI LANKA | 1,506,641.00 |
| COW DUNG | KG | THAILAND | 7,505.00 |
| COW DUNG | KG | VIETNAM | 52,812.00 |
| ORGANIC FERTILISERS | KG | AUSTRALIA | 4,488.00 |
| ORGANIC FERTILISERS | KG | GERMANY | 43,050.00 |
| ORGANIC FERTILISERS | KG | INDIA | 432,829.60 |
| ORGANIC FERTILISERS | KG | KOREAN REPUBLIC OF | 1,061.00 |
| ORGANIC FERTILISERS | KG | MALAYSIA | 421.00 |
| ORGANIC FERTILISERS | KG | NETHERLANDS | 64,000.00 |
| ORGANIC FERTILISERS | KG | SINGAPORE | 300.00 |
| ORGANIC FERTILISERS | KG | SRI LANKA | 1,096,828.80 |
| ORGANIC FERTILISERS | KG | THAILAND | 95,037.02 |

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| ORGANIC FERTILISERS | KG | UNITED STATES | 179.53 |
| ORGANIC FERTILISERS | KG | VIETNAM | 48,000.00 |
| UREA | KG | SRI LANKA | 5,569.90 |
| UREA | KG | VIETNAM | 20,000.00 |
| AMMONIUM SULPHATE | KG | INDIA | 1,350.00 |
| AMMONIUM SULPHATE | KG | MALAYSIA | 225.00 |
| AMMONIUM SULPHATE | KG | SRI LANKA | 6,750.00 |
| DOUBLE SALTS AND MIXTURES OF AMMONIUM SULPHATE AND AMMONIUM NITRATE | KG | VIETNAM | 13,000.00 |
| AMMONIUM NITRATE | KG | INDIA | 14.70 |
| MIXTURES OF AMMONIUM NITRATE WITH INORGANIC NON-FERTILIZING SUBSTANCES | KG | INDIA | 75,000.00 |
| MIXTURES OF AMMONIUM NITRATE WITH INORGANIC NON-FERTILIZING SUBSTANCES | KG | SRI LANKA | 758.00 |
| SODIUM NITRATE | KG | INDIA | 1.00 |
| DOUBLE SALTS AND MIXTURES OF CALCIUM NITRATE AND AMMONIUM NITRATE | KG | CZECH REPUBLIC | 50.00 |
| DOUBLE SALTS AND MIXTURES OF CALCIUM NITRATE AND AMMONIUM NITRATE | KG | SRI LANKA | 23,603.00 |
| DOUBLE SALTS AND MIXTURES OF CALCIUM NITRATE AND AMMONIUM NITRATE | KG | THAILAND | 11,000.00 |
| MINERAL OR CHEMICAL FERTILIZERS, NITROGENOUS , NES | KG | AUSTRALIA | 19,767.80 |
| MINERAL OR CHEMICAL FERTILIZERS, NITROGENOUS , NES | KG | BELGIUM | 7,200.00 |
| MINERAL OR CHEMICAL FERTILIZERS, NITROGENOUS , NES | KG | CHINA | 3,430.00 |
| MINERAL OR CHEMICAL FERTILIZERS, NITROGENOUS , NES | KG | GERMANY | 12,198.00 |
| MINERAL OR CHEMICAL FERTILIZERS, NITROGENOUS , NES | KG | INDIA | 350,894.50 |
| MINERAL OR CHEMICAL FERTILIZERS, NITROGENOUS , NES | KG | ITALY | 81,100.00 |
| MINERAL OR CHEMICAL FERTILIZERS, NITROGENOUS , NES | KG | MALAYSIA | 600.00 |
| MINERAL OR CHEMICAL FERTILIZERS, NITROGENOUS , NES | KG | SINGAPORE | 55.20 |
| MINERAL OR CHEMICAL FERTILIZERS, NITROGENOUS , NES | KG | SRI LANKA | 736,653.62 |
| MINERAL OR CHEMICAL FERTILIZERS, NITROGENOUS , NES | KG | THAILAND | 36,500.88 |
| MINERAL OR CHEMICAL FERTILIZERS, NITROGENOUS , NES | KG | UNITED ARAB EMIRATES | 3.96 |
| MINERAL OR CHEMICAL FERTILIZERS, NITROGENOUS , NES | KG | UNITED STATES | 706.62 |
| MINERAL OR CHEMICAL FERTILIZERS, NITROGENOUS , NES | KG | VIETNAM | 66,000.00 |
| MINERAL OR CHEMICAL FERTILIZERS, PHOSPHATIC, NES | KG | JAPAN | 4.00 |
| MINERAL OR CHEMICAL FERTILIZERS, PHOSPHATIC, NES | KG | SRI LANKA | 2,543.60 |
| POTASSIUM CHLORIDE | KG | INDIA | 38.50 |
| POTASSIUM CHLORIDE | KG | SINGAPORE | 2.00 |
| POTASSIUM CHLORIDE | KG | SRI LANKA | 500.00 |
| POTASSIUM SULPHATE | KG | INDIA | 900.00 |
| POTASSIUM SULPHATE | KG | MALAYSIA | 100.00 |
| POTASSIUM SULPHATE | KG | SRI LANKA | 1,750.00 |
| MINERAL OR CHEMICAL FERTILIZERS, POTASSIC, NES | KG | INDIA | 26,000.00 |
| MINERAL OR CHEMICAL FERTILIZERS, POTASSIC, NES | KG | SRI LANKA | 840.00 |
| MINERAL OR CHEMICAL FERTILIZERS, POTASSIC, NES | KG | THAILAND | 31.25 |
| MINERAL OR CHEMICAL FERTILIZERS, POTASSIC, NES | KG | UNITED ARAB EMIRATES | 2.00 |
| FERTILIZERS... IN PACKAGES OF A GROSS WEIGHT =<10KG | KG | SRI LANKA | 1,417.20 |
| FERTILIZERS... IN PACKAGES OF A GROSS WEIGHT =<10KG | KG | THAILAND | 12.00 |
| MINERAL OR CHEMICAL FERTILIZERS WITH NITROGEN, PHOSPHORUS AND POTASSIUM | KG | ITALY | 24,000.00 |
| MINERAL OR CHEMICAL FERTILIZERS WITH NITROGEN, PHOSPHORUS AND POTASSIUM | KG | MALAYSIA | 1,474.00 |
| MINERAL OR CHEMICAL FERTILIZERS WITH NITROGEN, PHOSPHORUS AND POTASSIUM | KG | SRI LANKA | 3,181.00 |
| MINERAL OR CHEMICAL FERTILIZERS WITH NITROGEN, PHOSPHORUS AND POTASSIUM | KG | VIETNAM | 13,000.00 |
| DIAMMONIUM HYDROGENORTHOPHOSPHATE (DIAMMONIUM PHOSPHATE) | KG | TURKEY | 100.00 |
| MINERAL OR CHEMICAL FERTILIZERS CONTAINING NITRATES AND PHOSPHATES | KG | SINGAPORE | 1.00 |
| MINERAL OR CHEMICAL FERTILIZERS CONTAINING NITRATES AND PHOSPHATES | KG | SRI LANKA | 24,855.00 |
| MINERAL OR CHEMICAL FERTILIZERS WITH PHOSPHORUS AND POTASSIUM, NES | KG | SRI LANKA | 2,342.10 |
| OTHER FERTILIZERS, NES | KG | INDIA | 25,205.00 |
| OTHER FERTILIZERS, NES | KG | SINGAPORE | 24.00 |
| OTHER FERTILIZERS, NES | KG | SRI LANKA | 27,300.00 |
| INSECTICIDES AND PESTICIDES, NES. | KG | AUSTRALIA | 251.29 |
| INSECTICIDES AND PESTICIDES, NES. | KG | CHINA | 22,027.80 |
| INSECTICIDES AND PESTICIDES, NES. | KG | FRANCE | 2.00 |
| INSECTICIDES AND PESTICIDES, NES. | KG | GERMANY | 3,522.00 |
| INSECTICIDES AND PESTICIDES, NES. | KG | GREAT BRITAIN | 7,147.00 |
| INSECTICIDES AND PESTICIDES, NES. | KG | INDIA | 5,418.56 |
| INSECTICIDES AND PESTICIDES, NES. | KG | INDONESIA | 113,409.18 |
| INSECTICIDES AND PESTICIDES, NES. | KG | ITALY | 10.01 |
| INSECTICIDES AND PESTICIDES, NES. | KG | KOREAN REPUBLIC OF | 1,530.00 |
| INSECTICIDES AND PESTICIDES, NES. | KG | MALAYSIA | 5,878.73 |
| INSECTICIDES AND PESTICIDES, NES. | KG | SINGAPORE | 14,227.24 |
| INSECTICIDES AND PESTICIDES, NES. | KG | SRI LANKA | 4,384.25 |
| INSECTICIDES AND PESTICIDES, NES. | KG | THAILAND | 558,273.57 |
| INSECTICIDES AND PESTICIDES, NES. | KG | UNITED ARAB EMIRATES | 1,019.00 |
| INSECTICIDES AND PESTICIDES, NES. | KG | UNITED STATES | 2,960.38 |
| INSECTICIDES AND PESTICIDES, NES. | KG | VIETNAM | 15,235.20 |
| INSECTICIDES AND PESTICIDES, NES. | KG | AUSTRALIA | 609.59 |
| INSECTICIDES AND PESTICIDES, NES. | KG | CHINA | 1,352.21 |
| INSECTICIDES AND PESTICIDES, NES. | KG | FRANCE | 0.08 |
| INSECTICIDES AND PESTICIDES, NES. | KG | GERMANY | 36.10 |
| INSECTICIDES AND PESTICIDES, NES. | KG | GREAT BRITAIN | 2.90 |
| INSECTICIDES AND PESTICIDES, NES. | KG | INDIA | 2,533.68 |
| INSECTICIDES AND PESTICIDES, NES. | KG | INDONESIA | 30,730.80 |
| INSECTICIDES AND PESTICIDES, NES. | KG | ITALY | 17.00 |
| INSECTICIDES AND PESTICIDES, NES. | KG | JAPAN | 15.84 |
| INSECTICIDES AND PESTICIDES, NES. | KG | MALAYSIA | 1,246.68 |

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| ORGANIC FERTILISERS | KG | UNITED STATES | 179.53 |
| ORGANIC FERTILISERS | KG | VIETNAM | 48,000.00 |
| UREA | KG | SRI LANKA | 5,569.90 |
| UREA | KG | VIETNAM | 20,000.00 |
| AMMONIUM SULPHATE | KG | INDIA | 1,350.00 |
| AMMONIUM SULPHATE | KG | MALAYSIA | 225.00 |
| AMMONIUM SULPHATE | KG | SRI LANKA | 6,750.00 |
| DOUBLE SALTS AND MIXTURES OF AMMONIUM SULPHATE AND AMMONIUM NITRATE | KG | VIETNAM | 13,000.00 |
| AMMONIUM NITRATE | KG | INDIA | 14.70 |
| MIXTURES OF AMMONIUM NITRATE WITH INORGANIC NON-FERTILIZING SUBSTANCES | KG | INDIA | 75,000.00 |
| MIXTURES OF AMMONIUM NITRATE WITH INORGANIC NON-FERTILIZING SUBSTANCES | KG | SRI LANKA | 758.00 |
| SODIUM NITRATE | KG | INDIA | 1.00 |
| DOUBLE SALTS AND MIXTURES OF CALCIUM NITRATE AND AMMONIUM NITRATE | KG | CZECH REPUBLIC | 50.00 |
| DOUBLE SALTS AND MIXTURES OF CALCIUM NITRATE AND AMMONIUM NITRATE | KG | SRI LANKA | 23,603.00 |
| DOUBLE SALTS AND MIXTURES OF CALCIUM NITRATE AND AMMONIUM NITRATE | KG | THAILAND | 11,000.00 |
| MINERAL OR CHEMICAL FERTILIZERS, NITROGENOUS , NES | KG | AUSTRALIA | 19,767.80 |
| MINERAL OR CHEMICAL FERTILIZERS, NITROGENOUS , NES | KG | BELGIUM | 7,200.00 |
| MINERAL OR CHEMICAL FERTILIZERS, NITROGENOUS , NES | KG | CHINA | 3,430.00 |
| MINERAL OR CHEMICAL FERTILIZERS, NITROGENOUS , NES | KG | GERMANY | 12,198.00 |
| MINERAL OR CHEMICAL FERTILIZERS, NITROGENOUS , NES | KG | INDIA | 350,894.50 |
| MINERAL OR CHEMICAL FERTILIZERS, NITROGENOUS , NES | KG | ITALY | 81,100.00 |
| MINERAL OR CHEMICAL FERTILIZERS, NITROGENOUS , NES | KG | MALAYSIA | 600.00 |
| MINERAL OR CHEMICAL FERTILIZERS, NITROGENOUS , NES | KG | SINGAPORE | 55.20 |
| MINERAL OR CHEMICAL FERTILIZERS, NITROGENOUS , NES | KG | SRI LANKA | 736,653.62 |
| MINERAL OR CHEMICAL FERTILIZERS, NITROGENOUS , NES | KG | THAILAND | 36,500.88 |
| MINERAL OR CHEMICAL FERTILIZERS, NITROGENOUS , NES | KG | UNITED ARAB EMIRATES | 3.96 |
| MINERAL OR CHEMICAL FERTILIZERS, NITROGENOUS , NES | KG | UNITED STATES | 706.62 |
| MINERAL OR CHEMICAL FERTILIZERS, NITROGENOUS , NES | KG | VIETNAM | 66,000.00 |
| MINERAL OR CHEMICAL FERTILIZERS, PHOSPHATIC, NES | KG | JAPAN | 4.00 |
| MINERAL OR CHEMICAL FERTILIZERS, PHOSPHATIC, NES | KG | SRI LANKA | 2,543.60 |
| POTASSIUM CHLORIDE | KG | INDIA | 38.50 |
| POTASSIUM CHLORIDE | KG | SINGAPORE | 2.00 |
| POTASSIUM CHLORIDE | KG | SRI LANKA | 500.00 |
| POTASSIUM SULPHATE | KG | INDIA | 900.00 |
| POTASSIUM SULPHATE | KG | MALAYSIA | 100.00 |
| POTASSIUM SULPHATE | KG | SRI LANKA | 1,750.00 |
| MINERAL OR CHEMICAL FERTILIZERS, POTASSIC, NES | KG | INDIA | 26,000.00 |
| MINERAL OR CHEMICAL FERTILIZERS, POTASSIC, NES | KG | SRI LANKA | 840.00 |
| MINERAL OR CHEMICAL FERTILIZERS, POTASSIC, NES | KG | THAILAND | 31.25 |
| MINERAL OR CHEMICAL FERTILIZERS, POTASSIC, NES | KG | UNITED ARAB EMIRATES | 2.00 |
| FERTILIZERS... IN PACKAGES OF A GROSS WEIGHT =<10KG | KG | SRI LANKA | 1,417.20 |
| FERTILIZERS... IN PACKAGES OF A GROSS WEIGHT =<10KG | KG | THAILAND | 12.00 |
| MINERAL OR CHEMICAL FERTILIZERS WITH NITROGEN, PHOSPHORUS AND POTASSIUM | KG | ITALY | 24,000.00 |
| MINERAL OR CHEMICAL FERTILIZERS WITH NITROGEN, PHOSPHORUS AND POTASSIUM | KG | MALAYSIA | 1,474.00 |
| MINERAL OR CHEMICAL FERTILIZERS WITH NITROGEN, PHOSPHORUS AND POTASSIUM | KG | SRI LANKA | 3,181.00 |
| MINERAL OR CHEMICAL FERTILIZERS WITH NITROGEN, PHOSPHORUS AND POTASSIUM | KG | VIETNAM | 13,000.00 |
| DIAMMONIUM HYDROGENORTHOPHOSPHATE (DIAMMONIUM PHOSPHATE) | KG | TURKEY | 100.00 |
| MINERAL OR CHEMICAL FERTILIZERS CONTAINING NITRATES AND PHOSPHATES | KG | SINGAPORE | 1.00 |
| MINERAL OR CHEMICAL FERTILIZERS CONTAINING NITRATES AND PHOSPHATES | KG | SRI LANKA | 24,855.00 |
| MINERAL OR CHEMICAL FERTILIZERS WITH PHOSPHORUS AND POTASSIUM, NES | KG | SRI LANKA | 2,342.10 |
| OTHER FERTILIZERS, NES | KG | INDIA | 25,205.00 |
| OTHER FERTILIZERS, NES | KG | SINGAPORE | 24.00 |
| OTHER FERTILIZERS, NES | KG | SRI LANKA | 27,300.00 |
| INSECTICIDES AND PESTICIDES, NES. | KG | AUSTRALIA | 251.29 |
| INSECTICIDES AND PESTICIDES, NES. | KG | CHINA | 22,027.80 |
| INSECTICIDES AND PESTICIDES, NES. | KG | FRANCE | 2.00 |
| INSECTICIDES AND PESTICIDES, NES. | KG | GERMANY | 3,522.00 |
| INSECTICIDES AND PESTICIDES, NES. | KG | GREAT BRITAIN | 7,147.00 |
| INSECTICIDES AND PESTICIDES, NES. | KG | INDIA | 5,418.56 |
| INSECTICIDES AND PESTICIDES, NES. | KG | INDONESIA | 113,409.18 |
| INSECTICIDES AND PESTICIDES, NES. | KG | ITALY | 10.01 |
| INSECTICIDES AND PESTICIDES, NES. | KG | KOREAN REPUBLIC OF | 1,530.00 |
| INSECTICIDES AND PESTICIDES, NES. | KG | MALAYSIA | 5,878.73 |
| INSECTICIDES AND PESTICIDES, NES. | KG | SINGAPORE | 14,227.24 |
| INSECTICIDES AND PESTICIDES, NES. | KG | SRI LANKA | 4,384.25 |
| INSECTICIDES AND PESTICIDES, NES. | KG | THAILAND | 558,273.57 |
| INSECTICIDES AND PESTICIDES, NES. | KG | UNITED ARAB EMIRATES | 1,019.00 |
| INSECTICIDES AND PESTICIDES, NES. | KG | UNITED STATES | 2,960.38 |
| INSECTICIDES AND PESTICIDES, NES. | KG | VIETNAM | 15,235.20 |
| INSECTICIDES AND PESTICIDES, NES. | KG | AUSTRALIA | 609.59 |
| INSECTICIDES AND PESTICIDES, NES. | KG | CHINA | 1,352.21 |
| INSECTICIDES AND PESTICIDES, NES. | KG | FRANCE | 0.08 |
| INSECTICIDES AND PESTICIDES, NES. | KG | GERMANY | 36.10 |
| INSECTICIDES AND PESTICIDES, NES. | KG | GREAT BRITAIN | 2.90 |
| INSECTICIDES AND PESTICIDES, NES. | KG | INDIA | 2,533.68 |
| INSECTICIDES AND PESTICIDES, NES. | KG | INDONESIA | 30,730.80 |
| INSECTICIDES AND PESTICIDES, NES. | KG | ITALY | 17.00 |
| INSECTICIDES AND PESTICIDES, NES. | KG | JAPAN | 15.84 |
| INSECTICIDES AND PESTICIDES, NES. | KG | MALAYSIA | 1,246.68 |

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| INSECTICIDES AND PESTICIDES, NES. | KG | SINGAPORE | 516.50 |
| INSECTICIDES AND PESTICIDES, NES. | KG | SRI LANKA | 714.05 |
| INSECTICIDES AND PESTICIDES, NES. | KG | THAILAND | 326,144.73 |
| INSECTICIDES AND PESTICIDES, NES. | KG | UNITED ARAB EMIRATES | 2,437.15 |
| INSECTICIDES AND PESTICIDES, NES. | KG | UNITED STATES | 777.58 |
| INSECTICIDES AND PESTICIDES, NES. | KG | AUSTRALIA | 37,551.00 |
| INSECTICIDES AND PESTICIDES, NES. | KG | CHINA | 6,718.00 |
| INSECTICIDES AND PESTICIDES, NES. | KG | FRANCE | 4.00 |
| INSECTICIDES AND PESTICIDES, NES. | KG | GERMANY | 120.00 |
| INSECTICIDES AND PESTICIDES, NES. | KG | GREAT BRITAIN | 100.00 |
| INSECTICIDES AND PESTICIDES, NES. | KG | HONG KONG | 48.00 |
| INSECTICIDES AND PESTICIDES, NES. | KG | INDIA | 154,072.00 |
| INSECTICIDES AND PESTICIDES, NES. | KG | INDONESIA | 6,374.00 |
| INSECTICIDES AND PESTICIDES, NES. | KG | MALAYSIA | 62.00 |
| INSECTICIDES AND PESTICIDES, NES. | KG | NETHERLANDS | 112.00 |
| INSECTICIDES AND PESTICIDES, NES. | KG | SINGAPORE | 600.00 |
| INSECTICIDES AND PESTICIDES, NES. | KG | SRI LANKA | 764.00 |
| INSECTICIDES AND PESTICIDES, NES. | KG | THAILAND | 1,879.00 |
| INSECTICIDES AND PESTICIDES, NES. | KG | UNITED ARAB EMIRATES | 16,966.00 |
| INSECTICIDES AND PESTICIDES, NES. | KG | UNITED STATES | 2,243.00 |
| FUNGICIDES. | KG | AUSTRALIA | 40.00 |
| FUNGICIDES. | KG | GREAT BRITAIN | 64.00 |
| FUNGICIDES. | KG | INDIA | 126.00 |
| FUNGICIDES. | KG | MALAYSIA | 72.00 |
| FUNGICIDES. | KG | NEW ZEALAND | 1,200.00 |
| FUNGICIDES. | KG | SINGAPORE | 287.73 |
| FUNGICIDES. | KG | SRI LANKA | 72.80 |
| FUNGICIDES. | KG | THAILAND | 503.68 |
| FUNGICIDES. | KG | UNITED STATES | 28.63 |
| FUNGICIDES. | KG | AUSTRALIA | 35.00 |
| FUNGICIDES. | KG | INDIA | 50.00 |
| FUNGICIDES. | KG | MALAYSIA | 288.00 |
| FUNGICIDES. | KG | SINGAPORE | 1,453.56 |
| FUNGICIDES. | KG | SRI LANKA | 76,762.40 |
| FUNGICIDES. | KG | THAILAND | 673.95 |
| FUNGICIDES. | KG | UNITED STATES | 15.45 |
| PLANT GROWTH REGULATOR. | KG | SRI LANKA | 90.50 |
| PLANT GROWTH REGULATOR. | KG | THAILAND | 1,490.00 |
| HERBICIDES & ALGAECIDES. | KG | CHINA | 148.00 |
| HERBICIDES & ALGAECIDES. | KG | CZECH REPUBLIC | 500.00 |
| HERBICIDES & ALGAECIDES. | KG | INDIA | 9.60 |
| WEED KILLER. | KG | THAILAND | 144.00 |
| PLANT GROWTH REGULATOR. | KG | INDIA | 200.00 |
| PLANT GROWTH REGULATOR. | KG | THAILAND | 425.80 |
| RODENTICIDES AND SIMILAR PRODUCTS , PUT UP FOR RETAIL SALE, NES. | KG | AUSTRALIA | 160.00 |
| RODENTICIDES AND SIMILAR PRODUCTS , PUT UP FOR RETAIL SALE, NES. | KG | CHINA | 6,000.00 |
| RODENTICIDES AND SIMILAR PRODUCTS , PUT UP FOR RETAIL SALE, NES. | KG | GERMANY | 24.00 |
| RODENTICIDES AND SIMILAR PRODUCTS , PUT UP FOR RETAIL SALE, NES. | KG | INDIA | 360.00 |
| RODENTICIDES AND SIMILAR PRODUCTS , PUT UP FOR RETAIL SALE, NES. | KG | INDONESIA | 128,060.00 |
| RODENTICIDES AND SIMILAR PRODUCTS , PUT UP FOR RETAIL SALE, NES. | KG | ITALY | 39.00 |
| RODENTICIDES AND SIMILAR PRODUCTS , PUT UP FOR RETAIL SALE, NES. | KG | SRI LANKA | 65.00 |
| RODENTICIDES AND SIMILAR PRODUCTS , PUT UP FOR RETAIL SALE, NES. | KG | THAILAND | 792.00 |
| RODENTICIDES AND SIMILAR PRODUCTS , PUT UP FOR RETAIL SALE, NES. | KG | UNITED ARAB EMIRATES | 24.00 |
| RODENTICIDES AND SIMILAR PRODUCTS , PUT UP FOR RETAIL SALE, NES. | KG | UNITED STATES | 3.00 |
| KNIVES AND CUTTING BLADES, FOR AGRICULTURAL, HORTICULTURAL... MACHINES | KG | AUSTRALIA | 6.00 |
| KNIVES AND CUTTING BLADES, FOR AGRICULTURAL, HORTICULTURAL... MACHINES | KG | SRI LANKA | 4.00 |
| KNIVES AND CUTTING BLADES, FOR AGRICULTURAL, HORTICULTURAL... MACHINES | KG | UNITED ARAB EMIRATES | 400.00 |
| ENGINES FOR AGRICULTURAL MACHINES | KG | INDIA | 3.00 |
| ENGINES FOR AGRICULTURAL MACHINES | KG | THAILAND | 49.00 |
| DISC HARROWS | KG | THAILAND | 92.00 |
| HARROWS (EXCL. DISC HARROWS), SCARIFIERS, CULTIVATORS, WEEDERS AND HOES | KG | CHINA | 4.00 |
| HARROWS (EXCL. DISC HARROWS), SCARIFIERS, CULTIVATORS, WEEDERS AND HOES | KG | NETHERLANDS | 1.00 |
| HARROWS (EXCL. DISC HARROWS), SCARIFIERS, CULTIVATORS, WEEDERS AND HOES | KG | SINGAPORE | 6.00 |
| HARROWS (EXCL. DISC HARROWS), SCARIFIERS, CULTIVATORS, WEEDERS AND HOES | KG | THAILAND | 1.00 |
| HARROWS (EXCL. DISC HARROWS), SCARIFIERS, CULTIVATORS, WEEDERS AND HOES | KG | UNITED STATES | 1.00 |
| GARDENING SHREDDER | KG | CHINA | 1.00 |
| GARDENING SHREDDER | KG | HONG KONG | 1.00 |
| GARDENING SHREDDER | KG | NETHERLANDS | 3.00 |
| GARDENING SHREDDER | KG | SINGAPORE | 2.00 |
| GARDENING SHREDDER | KG | SRI LANKA | 3.00 |
| GARDENING SHREDDER | KG | THAILAND | 26.00 |
| GARDENING SHREDDER | KG | UNITED ARAB EMIRATES | 50.00 |
| PARTS OF SOIL PREPARATION/CULTIVATION MACHINERY... | KG | CHINA | 1.00 |
| PARTS OF SOIL PREPARATION/CULTIVATION MACHINERY... | KG | SINGAPORE | 1.00 |
| PARTS OF SOIL PREPARATION/CULTIVATION MACHINERY... | KG | SRI LANKA | 1,002.00 |
| AGRICULTURAL ... FORESTRY OR BEE-KEEPING MACHINERY, NES | KG | CHINA | 5.00 |
| AGRICULTURAL ... FORESTRY OR BEE-KEEPING MACHINERY, NES | KG | CZECH REPUBLIC | 1.00 |
| AGRICULTURAL ... FORESTRY OR BEE-KEEPING MACHINERY, NES | KG | UKRAINE | 1.00 |
| AGRICULTURAL ... FORESTRY OR BEE-KEEPING MACHINERY, NES | KG | UNITED STATES | 4.00 |

**Appendix 4. The distribution of cultivable land per atoll in the Maldives.**

| No. | Locality (Atoll) | Cultivable Area | | Total Area (ha) | Per Capita Cultivable land (m2) |
|---|---|---|---|---|---|
| | | Inhabited Islands (ha) | Uninhabited Islands (ha) | | |
| 1 | Haa Alifu | 235 | 130 | 385 | 200 |
| 2 | Haa Dhaalu | 225 | 90 | 345 | 250 |
| 3 | Shaviyani | 123 | 121 | 244 | 230 |
| 4 | Noonu | 96 | 20 | 116 | 110 |
| 5 | Raa | 113 | 121 | 234 | 190 |
| 6 | Baa | 10 | 67 | 77 | 90 |
| 7 | Lhaviyani | 7 | 43 | 50 | 60 |
| 8 | Kaafu | 19 | 0 | 19 | 20 |
| 9 | Alifu Alifu | 51 | 22 | 73 | 60 |
| 10 | Alifu Dhaalu | 30 | 0 | 30 | 20 |
| 11 | Vaavu | 0 | 0 | 0 | 0 |
| 12 | Meemu | 12 | 0 | 12 | 20 |
| 13 | Faafu | 21 | 0 | 21 | 70 |
| 14 | Dhaalu | 0 | 0 | 0 | 0 |
| 15 | Thaa | 54 | 4 | 58 | 60 |
| 16 | Laamu | 350 | 85 | 435 | 430 |
| 17 | Gaafu Alifu | 160 | 101 | 261 | 320 |
| 18 | Gaafu Dhaalu | 107 | 184 | 291 | 240 |
| 19 | Gnaviyani | 81 | 0 | 81 | 120 |
| 20 | Seenu | 99 | 0 | 99 | 60 |
| | **Total** | **1793** | **988** | **2781** | **103** |

*Source: Ministry of Planning and National Development, Maldives, 2003.*

**Appendix 5. Islands visited during the fieldwork.**

**Key:**

**Types of island visited.**

(I) Inhabited islands - 20
(Rt) Resort islands - 19
(Ag) Agricultural islands – 6
(Ag/Rt) Agro tourism – 1
(Id) Industrial island – 1
(Rh) Research islands – 2
(U) Islands with urban centres – 2

**Islands/atolls visited:**

**Noonu atoll**
(I) Kedhikulhudhoo
(Rh) Kedhivaru
(Rt) Zitahli Resorts and Spa Kudafunafaru
(Rt) The Sun Siyam Iru Fushi
(Rt) Cheval Blanc Randheli
(Ag) Vattaru
(Ag) Minaavaru
(Ag/Rt) Maakurandhoo

**Haa Dhaalu atoll**
(Rh) Hanimaadhoo

**Baa atoll.**
(Ag) Ahenunfushi
(Rt) Anantara Kihavahhuruvalhi
(Rt) Four Season Resort Landaa Giraavaru
(I) Kamadhoo
(Rt) Soneva Fushi Resort and Spa

**Rasdhoo atoll.**
(Rt) Kurumathi
(I) Rasdhoo

**Laamu atoll.**
(I) Fonadhoo
(I) Gan
(Id) Maandhoo
(I) Isdhoo
(Rt) Six Senses Resort and Spa

**Foammulah atoll**
(I) Foammulah

**Haa Alifu atoll**
(Rt) JA Resorts Manafaru
(I) Huvarafushi (Hoarafushi)
(Ag) Seagull Group Maafahi
(I) Baarah
(I) Filladhoo
(I) Kelaa

**Kaafu atoll**
(Rt) Banyan Tree Vabbinfaru
(Rt) Paradise Island Resort and Spa Lankanfinolhu
(U) Villingili
(U) Male'
(I) Kaashidhoo
(Rt) Meeru

**Alifu Dhaalu atoll**
(Rt) Sun Island Resort and Spa

**Alifu Alifu atoll**
(I) Thoddoo
(I) Ukulhas
(Rt) Velidhu Island Resort

**Addu atoll.**
(I) Hulhumeedhoo
(I) Hithadhoo
(Rt) Shangri-La Resort and Spa
(Rt) Heretere

**Gaafu Dhaalu atoll**
(I) Vaadhoo

**Gaafu Alifu atoll.**
(I) Gemanafushi
(Rt) Hadahaa Park Hyatt

**Dhaalu atoll**
(Rt) Vilu Reef Resort
(Ag) Udhdhoo
(Ag) Lhohi

(Rt) Ayada Resort

**Faafu atoll.**
(I) Magoodhoo
(I) Nilandhoo

**Appendix 6. Participant consent form.**

## Participant Consent Form.

Interview no:

Interviewee name, age, and tel. no.

Participant category:

Venue:

Date and time:

The purpose of this interview is to gather information for research into advancing sustainable agriculture in the Maldives.

The information you provide in the interview will be treated as confidential material.

Should you wish to have a copy of the research recommendations, please tick this box ☐.

I agree to participate in this interview.

Interviewee signature:

Thank you for your participation in this interview.

**Appendix 7. Format for the interviews and discussions with farmers.**

## (For the use by the interviewer only).

## Hello and thank you for coming. Assalaam Alaikum, Aisdhineethee (ice deneetee), Shukuriyya.

### About me:

My past and present association with the Maldives, and how this has led to my research.

### About the interview:

I want to understand about the farmers story in the Maldives, and I would like to know how farmers feel about their stories. During the interview I hope the farmers can share their stories we me.

The reason I would like to learn about the farming stories is to better understand how farming in the Maldives works, and how it could maybe be improved in the future. For example, I would like to understand who does the farming on the islands, what the main challenges are, and how these could be overcome or reduced. At the end of my research, I would hope to share with you my recommendations for assisting farming in the Maldives.

The research will be carried out through interviews and group discussions with farmers and the people that affect their farming activity such as food traders, boat crews, resorts, and government officials.

The interviews will normally begin with a short survey of nine questions to find out about your basic farming activity. This will not take much time. We will then move onto the bigger ten questions which form the main interview or group discussion.

All the talking in the interviews and discussions will be taped if that is acceptable to everyone. Before starting the taping, I will ask everyone if they are happy to sign a consent form giving me permission for the recording to take place. I will use my laptop and phone for recording and will also take notes where I feel this will add to a fuller account of what is being said. As my Dhivehi is not very good, we will conduct the interviews in English using a translator if required.

All the things you say in the interviews and discussions are treated as confidential material. Nothing anyone says will have that person's name attached to it in the final writing of the research document.

During the interviews and discussion, please interrupt or ask questions at any time, especially if you do not understand what is being talked about.

*Sign the consent form.*

**A. Icebreaker survey.** Explain that these answers will be written down by me. No tape recording will take place for this section.

1. How long have you been farming? _____ .

2. Does your island have a register of farmers and, if so, have you registered?

   _____

3. Do you think farming activity has increased, decreased, remained the same over the last 10 years?

4. How many members in your family do the farming, and who does the most farming?

   _____

   _____

5. Are you a member of an informal farming group, Cooperative or NGO?

   a. Informal farming group:
   b. Coop / NGO:
   c. Other:

6. If you grow food, how many plots do you grow food on (home gardens, field plots, and what is their size?

   _____

   _____

7. What are the three main crops you grow?

   _____

   _____

8. Who do you sell most of your crops to?

   _____

   _____

9. Do you farm to mainly provide food for your family, or to sell, or both? Do you achieve these things?

   _____

   _____

## B. Discussion.

**Q1**. Is your island mainly known as a fishing island or an agricultural island or a mixed island, and has this changed over the years? If so, why, and how?

**Q2.** Who are the main farmers on your island (women/men/young/old), and what tasks do they perform? Has this changed over the years? Do you have people on the island who are known as good farmers? (knowledgeable, successful, big)

**Q3.** Is farming a part time or full time job, a hobby for enjoyment or a profession? How do you view agriculture, hard work, enjoyable?

*

**Q4.** Do you receive help from inside or outside the island for farming? If so, what type of help and who provides it? (Inside: Island council; agro dealers; shops; Co-ops; NGO's; friends; neighbours. Outside: Government; donors; banks; resorts; TV/radio messaging).

*

**Q5.** Most of the food we eat in the Maldives is imported from India/Sri Lanka, and further afield from places such as Dubai/Europe and Singapore. Imported food includes; fruit; vegetables; eggs; and the staples of flour, rice and sugar. Do you think that the Maldives can produce more of the food it needs? Can it produce more of what it produces now, and can it process this food into different products? Can Maldivian farmers produce new types of food? (Staples, meat, eggs, different fruit/veg). Do you know if any of this has been achieved?

**Q6.** What kind of food do you like to eat and why? What does a typical Maldivian diet consist of, and do you consider this as healthy? Do you think fresh food is healthier for you than processed food? (nutrition levels, pregnant females, food cost, perishability, ease of access and preparation, food hygiene).

*

**Q7.** There have been national efforts to collectivise production and marketing efforts through cooperatives. However, farmers have traditionally worked individually, within family groups or with small groups of friends. How do farmers on your island feel about farming together through a cooperative? Could some farming functions benefit from collective action? How do other collective models work and how successful are they?

*

**Q8.** What are the main problems for farming on your island? (Econ: markets; transportation; inputs; funding; land accessibility. Social: labour shortage; limited youth interest; lack of knowledge. Environ: limited freshwater reserves; land erosion; changing weather affecting crop seasons; pest intrusion; pesticide contamination).

**Q9.** What are the main benefits of doing farming on your island? (Econ: tourist markets;

profitable business. Social: family cohesion; healthy food; employment. Environ: good growing climate; thinking about good land stewardship).

**Q10**. Have you heard of the word 'sustainable'? If so, you may know that this word is sometimes used with the word agriculture, 'sustainable agriculture'. What do the words 'sustainable agriculture' mean to you?

**Q11.** Have you heard of the words 'building capacity'? If so, you may know that these words are sometimes used with the word agriculture, 'building capacity in agriculture'. What do the words 'building capacity in agriculture' mean to you?

**Q12.** Do you want to improve your farming operations or are you happy to continue the way you are? If you wish to improve, how do you want to improve (profitability; production; family involvement; commercial business). How do you think this improvement can be delivered to farmers?

## Appendix 8. Categories of participants interviewed.

| Categories of participants interviewed | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number of fieldtrips undertaken | | | | | | | | | | | | | | | | | | |
| **Participant category** | **Trip 1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **Total** |
| Farmers. | 6 | 5 | 8 | 8 | 17 | 5 | 8 | | | 13 | | | | | | | | 2 | **72** |
| Farmers/Coop members | 8 | 5 | | | | 5 | 1 | 4 | 15 | | | | | | | | | | **38** |
| Farmers/Island Officials | | 2 | | | 1 | | | | | 1 | | | | | | | | | **4** |
| Farmer/teacher | | | | 3 | 1 | | 1 | | | | | | | | | | | | **5** |
| Farmer/student/youth | | | | 1 | 2 | | | | | 6 | | | | | | | | | **9** |
| Farmer/trader | | | | | | | 1 | | | | 2 | | | | | | | | **3** |
| Farmers/island owners/managers | | 1 | | | | | | | 2 | | | 1 | | | 3 | | 3 | 13 | **23** |
| Fisherman coop | | | | | | | | 5 | | | | | | | | | | | **5** |
| Coop members | 1 | 1 | | | | 10 | 4 | | 5 | | | | 4 | | 5 | | | 2 | **32** |
| Island Officials | 3 | 3 | 1 | 1 | 1 | 2 | 1 | | | | | | 3 | | 4 | | | 2 | **21** |
| Migrant labour | | 1 | | | 12 | | 4 | | | 1 | | | | | | | | 6 | **24** |
| Health practitioners | | 4 | 4 | 2 | 2 | 3 | 4 | | | 1 | | | | | | | | | **20** |
| Health practitioner/farmer | | | | | 1 | | | | | | | | | | | | | | **1** |
| Teaching practitioners | | 3 | 1 | 1 | 2 | 1 | 1 | | | | | | | | | | | 2 | **11** |
| Students/youth | | | 1 | 18 | | 3 | 4 | | | | | | | | | | | | **26** |
| Customers/food traders | | | | | | 1 | | | | | | | | | | | | 13 | **14** |
| Customers/restuarants | | | | 2 | | | | | | | | 2 | | | | | | | **4** |
| Customers/resorts | | | 1 | | 3 | 1 | 3 | 2 | 1 | | 2 | 2 | | 4 | 5 | 2 | 4 | 7 | **37** |
| Agro dealers | | | 1 | 1 | 1 | 1 | | | | | | | | | | | | 5 | **9** |
| Gov. official | | | | | 2 | | | | 1 | | | | | | | | | 5 | **8** |
| NGO official/donor | | | | | | | | | 1 | | | | | | | | | 4 | **5** |
| Dhoni captain | | | 2 | | | | | | | | | | | | | | | | **2** |
| | 18 | 25 | 19 | 37 | 45 | 32 | 32 | 11 | 25 | 22 | 4 | 5 | 7 | 4 | 17 | 2 | 7 | 61 | **373** |

**Appendix 9. Approval to proceed with the research**



بسم الله الرحمن الرحيم

**Ministry of Fisheries and Agriculture**
Male', Maldives

No: 30-A/PRIV/2013/419

7 July 2013

**Letter of Introduction.**

**Re: Mr Paul Van Driessche.**

Mr Paul Van Driessche will be undertaking doctoral research in the Maldives during 2013/14 as part of his PhD requirement with Imperial College London. During his stay in the Maldives, he will be looking at how sustainable agricultural capacity is developing in the country by conducting fieldwork on selected islands and in Male'. The information gathered will be used for academic purposes in the compilation of a doctoral dissertation.

With this research in mind, the Ministry of Fisheries and Agriculture would kindly request that assistance is given to Mr Van Driessche where possible during his research in the Maldives.

We thank you for your cooperation in this matter.

Thank you.

Yours Sincerely,

Abdulla Naseer, PhD
Permanent Secretary

Velaanaage, Ameer Ahmed Magu, 20096
Male', Republic of Maldives
Phone: (+960) 332 2625 Fax: (+960) 332 6558 Website: www.fishagri.gov.mv Email: admin@fishagri.gov.mv

## Appendix 10. The conversion of ten codes into six core codes.

| Core code | Subcode | No. of participants | No. of references. |
|---|---|---|---|
| 1. Poor market connectivity | 1a | 53 | 63 |
| | 6a | 58 | 72 |
| | 6b | 30 | 42 |
| | 6c | 21 | 36 |
| | 6e | 16 | 21 |
| | 7b | 101 | 272 |
| | 7c | 100 | 238 |
| | 7e | 79 | 151 |
| | 7g | 57 | 119 |
| | 8a | 87 | 104 |
| | 8b | 81 | 136 |
| | 8c | 58 | 85 |
| | 8d | 41 | 72 |
| | 8e | 36 | 65 |
| | **Total** | **818** | **1476** |
| | | | |
| 2. Enhanced MoFA assistance required for farmers | 1d | 26 | 32 |
| | 1f | 14 | 27 |
| | 1c | 37 | 47 |
| | 2a | 52 | 65 |
| | 2b | 29 | 38 |
| | 5c | 33 | 58 |
| | 6d | 18 | 25 |
| | 7a | 102 | 290 |
| | 9a | 55 | 80 |
| | 10a | 78 | 95 |
| | 10b | 71 | 105 |
| | 10c | 61 | 81 |
| | 10d | 31 | 37 |
| | **Total** | **607** | **980** |
| | | | |
| 3. Stigmatisation of farming as a low-class activity | 2c | 8 | 10 |
| | 4a | 85 | 184 |
| | 5a | 69 | 148 |
| | 5b | 37 | 68 |
| | 5c | 33 | 58 |
| | 5d | 51 | 91 |
| | 9a | 55 | 80 |
| | 9b | 38 | 52 |
| | 9c | 25 | 31 |
| | **Total** | **401** | **722** |
| | | | |
| 4. Profitability motivates people to enter the food sector | 1a | 53 | 63 |
| | 2a | 52 | 65 |
| | 3a | 121 | 150 |
| | 3b | 31 | 37 |
| | 3c | 25 | 27 |
| | 5d | 51 | 91 |
| | 7f | 62 | 100 |
| | **Total** | **395** | **533** |
| | | | |
| 5. Farming is preferred as an individualistic and family Orientated activity that is often assisted by migrant labour | 4a | 85 | 184 |
| | 4b | 78 | 129 |
| | 4c | 56 | 78 |
| | **Total** | **219** | **391** |
| | | | |
| 6. Participants' understanding of the term 'sustainable agriculture'. | 1a | 53 | 63 |
| | 1b | 51 | 73 |
| | 1c | 37 | 47 |
| | 1d | 26 | 32 |
| | 1e | 18 | 19 |

| | | | |
|---|---|---|---|
| | 1f | 14 | 27 |
| | | **199** | **261** |
| | | | |
| Participants' understanding of the term 'building capacity in agriculture | 2a | 52 | 65 |
| | 2b | 29 | 38 |
| | 2c | 8 | 10 |
| | | **89** | **113** |
| | | | |