



Investing in rural people

Maldives

Maldives Agribusiness Programme

Project Design Report

Main report and annexes

Mission Dates: 12 - 29 November 2019

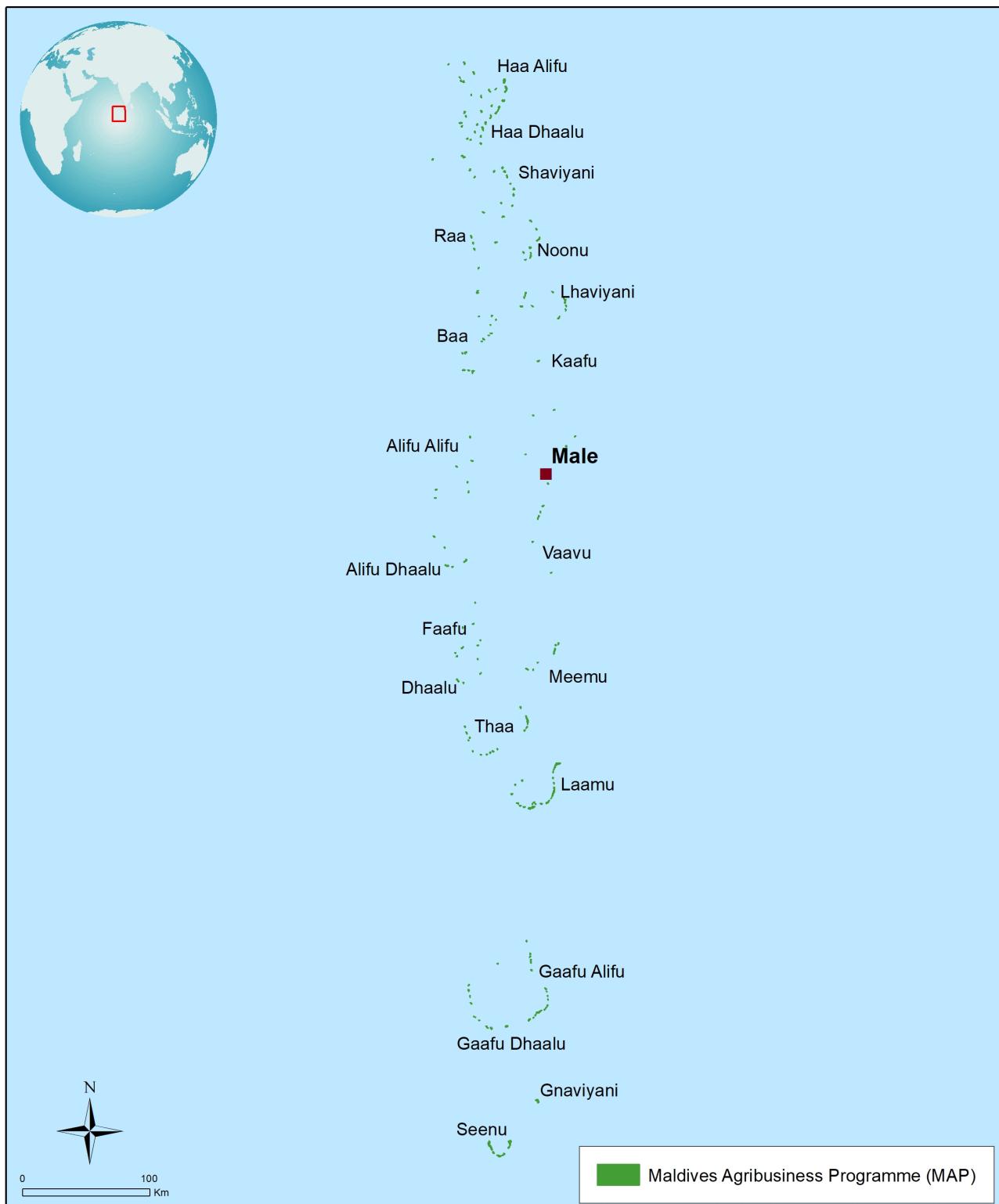
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Programme Management Department

Map of the Project Area



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Abbreviations and Acronyms

AA	Authorized Allocation
ADB	Asian Development Bank
AICT	Agriculture Information and Communication Technology
ARC	Agriculture Research Center
AWPB	Annual Work Plan and Budget
BARI	Bangladesh Agriculture Research Institute
CAI	Commercial Agricultural Island
CGIAR	Consultative Group for International Agricultural Research
CSN	Country Strategy Note
CTA	Chief Technical Advisor
CVA	Climate Vulnerability Assessment
DA	Designated Account
DWT	Dead weight tonnage
ELF	Extension Link Farmer
EOI	Expression of Interest
EIRR	Economic Internal Rate of Return
FA	Financing Agreement
FAO	Food and Agriculture Organization
FADIP	Fisheries and Agriculture Diversification Programme
FM	Financial Management
GAP	Good Agricultural Practice
GDP	Gross Domestic Product
GoM	Government of Maldives
HACCP	Hazard Analysis and Critical Control Point
ICP	IFAD Client Portal
ICT	Information and Communication Technology
ICU	Implementation Coordination Unit (ICU)
IFAD	International Fund for Agriculture Development
IGA	Income Generating Activity
IPM	Integrated Pest Management
IPSAS	International Public Sector Accounting Standards
KM	Knowledge Management
LDH	Loan Disbursement Handbook
Ltd.	Limited
LTB/R	Letter to Borrower/Recipient
MACO	Maldives Agro Corporation
MAP	Maldives Agribusiness Programme
M&E	Monitoring and Evaluation
MED	Ministry of Economic Development
MEDEP	Mariculture Enterprise Development Project
MGAP	Maldives Good Agricultural Practice
MGFSS	Ministry of Gender Family and Social Services
MFLC	Maldives Finance Leasing Company
MOFMRA	Ministry of Fisheries, Marine Resources and Agriculture
MOF	Ministry of Finance

MONPI	Ministry of National Planning and Infrastructure
MoU	Memorandum of Understanding
MSME	Micro, Small and Medium-Scale Enterprises
NPV	Net Present Value
ORMS	Operational Results Measurement System
PCR	Project Completion Review/Report
PD	Programme Director
PIU	Programme Implementation Unit
PIM	Programme Implementation Manual
PSC	Programme Steering Committee
Pvt.	Private
RCF	Revolving Credit Fund
SDFC	SME Development Finance Corporation
SDG	Sustainable Development Goal
SECAP	Social Environment and Climate Assessment
SME	Small and Medium Enterprises
SOE	Statement of Expenditure
TA	Technical Assistance
UNOPS	United Nations' Office for Project Services
VC	Value Chain
WA	Withdrawal Application
WFP	World Food Programme

In line with IFAD11 mainstreaming commitments, the project has been validated as:

Gender transformational Youth sensitive Nutrition sensitive Climate finance

IFAD Adaptation Finance	\$3,264,000
IFAD Mitigation Finance	N/A
Total IFAD Climate-focused Finance	\$3,264,000

Executive Summary

Rationale. The agriculture sector is the third sector of the Maldives economy after tourism and fisheries. However, it is lagging behind due to a set of constraints. The country faces complex challenges posed by a fragile ecology and climate change vulnerability. Cultivable land is limited, as is the availability of technology to enhance production and productivity. Logistics and market access are also significant challenges. Farming is mostly practiced in an unorganized manner and on a limited scale. Small farmers in the outer atolls suffer the most in terms of periodic food insecurity and poverty. There is limited public and private investment in the sector; as a result, the country relies heavily on imported agricultural products. In light of the challenges, and in the absence of systematic investment in agriculture, implementation of the national Agricultural Development Master Plan has been successful.

The Maldives Agribusiness Programme (MAP) will help the Government to address these challenges. It will support the Ministry of Fisheries, Marine Resources and Agriculture (MOFMRA) to refine its evolving vision and implement a structured policy and incentive framework for the agriculture sector. It will provide investment resources to capitalise on the opportunities existing for sectoral growth. It will introduce climate-smart technological solutions suitable for the Maldives, which overcome land/soil constraints and mitigate against climate change, and which are available globally. It will capitalise on the significant market for local crop production, considering that local demand is rising rapidly as incomes increase and consumers become more aware of nutrition and food safety considerations, and that the tourism sector imports substantial volumes of agricultural commodities per year.

Climate change. The Maldives is highly vulnerable to climate change. The potential impacts include salt-water intrusion and erosion due to gradual rise in the sea level, change in rainfall patterns and increase in frequency of extreme climatic events. Salt-water intrusion due to gradual rise in the sea level is devastating for agriculture. The global mean sea level rose 10-20 cm during the 20th century at the rate of 1 to 2 mm/year. For the Maldives, the long-term trend observed in the relative rise of the sea level for Hulhule is 1.7 mm/year. Investment in the agriculture sector must necessarily be climate-smart.

Goal and objective. The programme's goal is to sustainably increase the incomes, food security and nutrition status of small farmer households. Its development objective is the strengthened enabling environment for sustainable and climate-resilient agriculture. This objective will be achieved through reformed policies, strengthened institutions and services, enhanced agricultural technologies and better access to financing and markets for small farmer households.

Programme area. The programme will be nationwide in scope, articulated within the National Spatial Plan, covering all regional and sub-regional hubs, clusters and islands where agriculture is undertaken by small farmers. Investments will initially be focused in regions 1-3 of the northern atolls, where poverty and vulnerability among the farming communities is greater, and will subsequently expand nationwide.

Target groups. The target group consists of small farmers. They include women, men, and youth belonging to households of different socio-economic categories. With a considerable socio-economic and socio-cultural divide between rural and urban populations, also with respect to gender and age, small farmers who depend mainly on agriculture for their livelihood are economically one of the most disadvantaged and vulnerable groups in the country.

Gender. The programme will ensure equal opportunity for women in all activities and investments – management, planning, decision making, participation in training, access to inputs, technology, financing, services and markets, and access to an equal share of social, financial and economic benefits. Of the direct beneficiaries, at least 53% will be women.

Youth. The programme will systematically target young farmers, particularly those inclined to adopt advanced production techniques. It will explore opportunities to engage the youth in agribusiness development, agri-technologies and knowledge transfer, modern agriculture management, market linkages and IT technologies in support of production and post-production management. Of the direct beneficiaries, at least 20% will be the youth.

Components. The programme has three inter-linked components: (i) enabling policy, institutions and services; (ii) climate-smart production; and, (iii) market connection.

Component 1 - Enabling policy, institutions and services. The expected outcome of this component is the development of the enabling policy, institutional and service provision environment that will allow increased productivity and production of agricultural commodities demanded by the market. It has five outputs: (i) policy knowledge products on sustainable and climate-resilient agriculture will be completed based on relevant thematic and sector analysis, and will be applied to promote an enabling environment for agriculture; (ii) the capability of the Agriculture Research Centre in Hanimaadhoo Island to generate climate resilient knowledge and technology will be upgraded; (iii) packages of recommendations for increasing financial returns and enhancing resilience will be developed for small farmers; (iv) new technologies and improved inputs will be transferred to small farmers; and, (v) an Agriculture Information and Communication Technology (AICT) service will be established.

Component 2 – Knowledge and technology. The expected outcome of this component is the increased productivity and production of agricultural commodities demanded by the market. It has three outputs: (i) climate-smart production of high value commodities by

small farmers will be increased through the application of improved inputs, equipment and modern technologies; (ii) Island Farmer Forums' capability to provide the required quantity and quality of produce in response to market demand will be enhanced; and (iii) farmer access to agriculture financing will be improved.

Component 3 – Market connection. The expected outcome of this component is the development of market linkages and upgraded transportation logistics among organised producers and buyers. Four marketing channels will be offered to Island Farmer Forums: (i) wholesale markets at regional hubs, sub-regional hubs, and central/satellite clusters with improved facilities; (ii) commercial agriculture islands operating on contract farming basis; (iii) central (Malé) wholesale market and associated logistics; and, (iv) tourism resorts.

Programme management. The programme will be managed by MOFMRA, operating through a Programme Implementation Unit (PIU) which will be established with strong management skills and technical resources. The PIU will play a crucial role in the overall project management and coordination mechanism of MAP. It will be responsible for the daily project management and implementation, and also the coordination among all implementing agencies. It will be composed of a programme director, three component coordinators, technical staff on targeting/gender, and fiduciary staff (financial management, procurement). UNOPS will be contracted to strengthen programme management capacities within MOFMRA and to support the PIU in the implementation of MAP. UNOPS will provide a qualified and experienced Chief Technical Advisor on long-term basis, and short-term technical specialists as required.

Programme implementation. The structure of programme implementation responsibilities is outlined below.

Component	Component/Subcomponent	Implementing Agencies
Component 1	Enabling policy, institutions, services	MOFMRA
Subcomponent 1.1	Knowledge and technology	ARC
Subcomponent 1.2	Input supply	MACO and ARC
Component 2	Climate-smart production	MACO, ARC, SDFC, MFLC
Component 3	Market connection	MOFMRA, MACO, SDFC, MFLC
Management	Technical assistance	UNOPS

Programme costs and financing. The total programme cost amounts to USD 12.9 million (MVR 195.8 billion) over a five-year implementation period. It will be financed by an IFAD loan of USD 3.3 million, an IFAD grant of USD 1.2 million, MACO contribution of USD 0.2 million, private investment (commercial islands, MFLC, beneficiaries) of USD 1.1 million, SDFC cofinancing of USD 5.0 million, and Government contribution in cash of USD 2.1 million. IFAD financing will be provided on 73% highly concessional basis and 27% DSF grant basis. Opportunities to leverage cofinancing from partners would be sought during implementation.

Economic analysis. The programme's economic internal rate of return (EIRR) over a 20-year period is 12.9%, and the economic net present value is USD 9.1 million. This indicates that the programme is a technically and economically viable investment for the economy. The sensitivity analysis shows that the programme is robust in light of potential risks in terms of increased costs, decreased benefits or time overruns.

Beneficiaries. MAP will directly benefit 6,000 households consisting of 31,800 persons. These consist of 1,720 households benefitting from the full range of investments (training, loans, matching grants, market infrastructure), 4,280 households benefiting from training and market access investments, and 2,460 incremental full time job equivalents created.

SECAP and climate risk. The programme is classified as environmental and social category B, as its activities will not trigger any category A criteria. The climate risk category for MAP is rated as High, as it meets 4 of the 7 initial criteria of climate risk screening. Accordingly, appropriate mitigation measures have been put in place.

Alignment and partnerships. MAP is aligned with the national Agricultural Development Master Plan 2010-2025, the agriculture sector elements of the national Strategic Action Plan 2019-2023, and the Government's evolving vision for the agriculture sector. It is also aligned with the IFAD approach paper on Small Island Developing States, the country strategy note for the Maldives, and the South-South and Triangular Cooperation framework. MAP will seek partnerships with national programmes, externally financed projects, and stakeholder consultation platforms in the country.

Financial management. Programme financial management will comply with IFAD and Government guidelines and requirements. It will be structured around proper accounting and reporting, strengthened internal controls, an internal audit framework, and annual external audit by the Auditor General, which is the supreme audit institution in the country.

Procurement. Procurement under MAP will be undertaken by the PIU in accordance with the National Procurement Regulations

(Chapter 10 of the Public Financial Regulations) to the extent that they do not contradict IFAD's Procurement Guidelines and Procurement Handbook; where there are contradictions, IFAD's Guidelines and Handbook will prevail.

Planning, M&E, KM. The programme will apply a results-based management approach which establishes solid linkages between planning/budgeting, implementation, monitoring and results. An integrated M&E and KM system will be developed, and output, outcome and impact data generated by the system will inform case studies, briefs and reports, to be used for policy dialogue, learning, and scaling-up. KM activities will focus on the relationships between the enabling environment, climate-smart production, and agricultural modernisation.

Sustainability. The design of MAP integrates substantial elements to assure its financial, sectoral, institutional, nutritional, technical and environmental sustainability.

1. Context

A. National context and rationale for IFAD involvement

a. National Context

1. *Background.* An ecologically fragile Small Island Developing State highly vulnerable to climate change, the Maldives consists of a chain of 26 atolls and over 1,190 islands of which 188 are inhabited and 132 are tourism resorts. The population was estimated to be 436,330 in 2017. Of the total land area of 30,000 hectares, only 4,000 hectares are considered to be arable across some 197 islands. A total of 8,057 farms are registered, with an aggregate land area of 573 hectares and an average farm size of over 700 square meters.
2. *Macro-economic context.* Maldives is classified as a middle-income country, with GDP estimated at USD 4.7 billion in 2018 and a per capita income of USD 10,330 in current terms. GDP growth amounted to 7.5% in 2018, with agriculture, industry and services (including tourism) contributing 6.6%, 14.9% and 78.5% respectively. GDP is expected to continue growing in the medium term due to growth in tourism and construction, and related sectors such as transport, communications, and trade. However, the current account deficit widened sharply from 3.2% in 2014 to an estimated 29.8% in 2018, driven by the large increase in investment-related imports. The recent World Bank-IMF Debt Sustainability Analysis assessed Maldives' risk of external debt distress as high, mainly due to widening of the current account deficit, low international reserves and rapid debt build-up. The Government also recognises that further efforts are required to make growth more regionally balanced and inclusive, as the economic disparities between Malé and other inhabited islands are widening, but transport infrastructure remains limited.
3. *Poverty.* Although GDP growth has been impressive in recent years, poverty continues to be a challenge, particularly in the outer atolls. The Household and Expenditure Survey of 2016 found 8.2% of the population to be living below the national poverty line. However, regional disparities are significant; poverty incidence was only 1.7% in Malé but 12.8% in the atolls. Urban-rural disparities are also striking; it is estimated that rural poverty is three times higher than urban poverty. Poverty is correlated with sector of employment of the household head; those working in agriculture and fisheries are found to be poorer than those in industry or services. Although improving, the Gini coefficient of 0.31 (2016) confirms the incidence of relative inequality in the country. The 2014 Census found that of the 15,130 persons employed in fisheries and agriculture, 13,598 (90%) are employed in the atolls.
4. *Agriculture.* The agriculture sector is the third sector of the economy after tourism and fisheries. However, it is lagging behind due to a series of challenges. The country faces the complex challenges posed by a fragile ecology and climate change vulnerability. Cultivable land is limited, as is the availability of technology to enhance production and productivity. Logistics and market access are also significant challenges. Farming is mostly practiced in an unorganized manner and on a limited scale. Small farmers in the outer atolls suffer the most in terms of periodic food insecurity and poverty. The absence of organized agriculture data also hinders the orientation of public and private investments in the sector; as a result, the country relies heavily on imported agricultural products. In light of these challenges, and in the absence of systematic investment in agriculture, implementation of the national Agricultural Development Master Plan has been successful.
5. *Food security.* The Maldives has reached an Average Dietary Energy Supply Adequacy ratio of above 120, which is higher than the average in Asia at 117. However, it is estimated that 20% Maldivians suffer from food insecurity. Given that about 95% of the country's food consumption is met by imports, the Maldives is extremely vulnerable to changes or shocks in global food supply and prices. Food trade, storage and distribution play a critical role in the access and availability dimensions of food security. With water constituting 99% the territorial area, and with distantly located small island populations scattered across the country, marine transport is the most important mode for the transport of all goods including food items. The quantity of food items transported to outlying islands in a single trip by a cargo boat is limited and delivery is often unreliable. Hence, it is common for the rural population to experience periodic food shortages, especially of nutritious fresh products such as milk, eggs, vegetables and fruit. Food storage facilities in the northern atolls (main warehouse in Kulhudhuffushi) and southern atolls (main warehouse in Hithadhoo) are insufficient to maintain food reserves, particularly in times of emergency. Given the dependence on imports, unreliable distribution patterns, and inadequate decentralised storage facilities, the rural population in the Maldives face serious risks of periodic food insecurity.
6. *Logistics and transportation.* Logistics and transportation along agriculture value chains are a major constraint for agriculture market linkages. The most common sea vessels for inter-island cargo transport are wooden mechanised boats (*dhonis*) ranging in size from small one-person boats to 30-40 meter boats with a dead weight tonnage (DWT) of up to 160 mt. Most *dhonis* are fishing vessels, but several hundred are used as cargo boats; the smaller ones move between nearby islands, while the larger

vessels ply the waters between the regions and Malé. Most resort islands have a large vessel with cold storage for collecting supplies once or twice a week from the Malé region, including meat, dairy products, fish and vegetables. Some resorts also use these vessels for collecting vegetables from the airport islands, and from regional and sub-regional hubs having a vegetable wholesale market. Most commercial agricultural islands also have refrigerated cargo vessels mainly used to transport produce to Malé and to a less extent to resort islands. Despite this fleet of vessels, most inhabited islands where agriculture is practised face unreliable transport services and mostly as ambient cargo, resulting in substantial losses, rendering crop production unprofitable. This situation makes transportation of agriculture produce one of the most limiting factors along the value chain.

7. *Financial services.* An initiative of the Maldives Monetary Authority and the International Finance Corporation, the Maldives Finance Leasing Company Pvt Ltd (MFLC) has been in operation since June 2002. The primary objective of setting up the company was to diversify the Maldivian financial sector. In April 2014, MFLC was acquired by Tree Top Investments Pvt Ltd, a company founded in 2013 by a group of successful businesspersons with illustrious careers. MFLC finances the lease of movable assets to small and medium scale business enterprises. It finances the lease of marine vessels, mainly fishing boats with cold storage, plant, machinery, equipment, and vehicles, to the commercial sector, and more recently, motorbikes and consumer durables to individuals.
8. The SME Development Finance Corporation (SDFC) was established in February 2019 as a specialized financial institution to provide financial products and ancillary services to enterprises and entrepreneurial start-ups, with the primary objective of easing access to finance for MSMEs. SDFC is under the patronage of the Ministry of Economic Development (MED). It has developed and introduced six products, of which the '*Dhanduveri Nafaa*' product is specifically for the agriculture sector and provides loans of up to MVR 75,000 for home-based farmers, MVR 500,000 for non-registered business individuals, and MVR 2 million for companies and partnership business entities. This loan product was introduced in collaboration with MOFMRA to help provide access to finance for individuals and corporative societies in the agriculture sector, with a focus on encouraging the integration of new technologies in farming. It requires 20% equity by the applicant and 120% of the loan amount as collateral. The assets procured through the loan are regarded as collateral.

b. Special aspects relating to IFAD's corporate mainstreaming priorities

9. *Climate change.* The Maldives is highly vulnerable to climate change. The potential impacts include salt-water intrusion and erosion due to gradual rise in the sea level, change in rainfall patterns and increase in frequency of extreme climatic events, such as flooding. This may result in increased pollution and contamination of surface water from overflowing of the septic tank into the aquifer.
10. Salt-water intrusion due to gradual rise in the sea level is devastating for agriculture. The global mean sea level rose 10-20 cm during the 20th century at the rate of 1 to 2 mm/year. For the Maldives, the long-term trend observed in the relative rise of the sea level for Hulhule is 1.7 mm/year. Sea level rise causes salinization of groundwater. Freshwater is vital for sustaining agriculture, but little water can be drawn without changing its salinity level. Increasing salinity changes soil quality, affecting plant growth and yield. The vulnerability of agriculture to salt-water intrusion was evident from the damage caused by the Indian Ocean tsunami of 2004.
11. Sea level rise also exacerbates erosion. In 2009, forty-one inhabited islands reported severe beach erosion. Empirical evidence suggests that many plant species in close proximity of the coastline are affected by erosion. Coconut and other salt tolerant species are destroyed by severe erosion. Coconut is the dominant crop in the country and constitutes an important part in the diet and a key source of livelihoods. Coconut timber is used for boat building and house construction, while thatch from leaves is used in construction of tourist resorts. Tender coconut is sold throughout the year, especially in Malé and the resorts. Damage to agriculture including coconut palms affects livelihood and incomes, directly affecting food security.
12. Decline in rainfall patterns can be devastating to agriculture production. Crops are either rainfed or irrigated from harvested rain water, and surface water is inadequate throughout the country. Traditionally, farmers depended on shallow wells as a source of water for agriculture; today, in many islands the groundwater cannot be used due to contamination. The thickness of the groundwater aquifer at island level is determined by the rainfall recharge, island size and permeability of the soil column. Freshwater aquifers already stressed from over-extraction face the risk of total depletion during dry spells. However, climate change predictions depict an increase in annual rainfall for the Maldives, indicating a positive impact on freshwater resources.
13. An elevated sea level, with high winds during storm surges, causes significant damage and losses to agricultural land. Storm surges can create high waves causing destruction of crops and storage facilities. Flooding and strong winds have also curtailed production by uprooting trees and plants. Loss of fertile top soil further deteriorates productivity, and causes changes in pest and disease voracity and weed growth.
14. *Nutrition.* The Maldives Health Profile of 2016 highlighted that in spite of improvements in many areas of health, malnutrition among children continues to be a public health concern. The Maldives Demographic Health Survey of 2016-17 found that 15% of children under 5 years of age were stunted, 15% were underweight, and 9% were wasted. In addition, half of the children aged 6-59 months and 63% of women aged 15-49 were found to be anaemic, indicating high levels of micro-nutrient deficiencies. Weaning and feeding practices of infants and children are a major cause of the continued malnutrition problem; deficiencies in iron, zinc and vitamin A, particularly among women and pregnant women, were found to be of significant concern.
15. *Gender and social inclusion.* The Maldives ranks 101st of 164 countries rated by the Gender Development Index (2017), 106th of 144 countries rated by the Gender Gap Index (2017), and 76th of 160 countries rated by the Gender Inequality Index. These rankings confirm that much needs to be done to improve women's empowerment and their access to services and opportunities. Furthermore, women's participation in the labour force, at only 37% in 2017, is very low. The 2014 National Bureau of Statistics data showed that women make up only 12% of labour force in agriculture and fisheries, while a more significant proportion (88%) is engaged in the processing and manufacturing sub-sectors of agriculture and fisheries.

16. Women are also most widely engaged in vegetable and horticulture production in home gardens and in small isolated plots, which play a vital role in rural livelihoods, food security and income generation. They are predominantly used for perennial crops such as coconut, breadfruit, mango, guava, bilimbi, water-apple, Malay apple, stone apple, banana, papaya, betel leaf and curry leaf, as well as root crops such as taro on certain islands. This produce is often used for household consumption or sold on the island or to neighbouring islands.
17. There are 3,992 registered women farmers that account for 53% of all registered farmers, indicating that there is no gender disparity in allocating arable land. The general practise is for Island Councils to allocate land to community members who apply for farming. In the agriculture sector, gender division across roles exists; generally women contribute to crop production, value addition and natural resource management. Women often assist men in farming activities, while some are also fully engaged in related value-added activities. Selling produce in markets is considered a male responsibility. Although gender roles are largely fixed in agriculture and fisheries, as modernisation brings changes to the island way of life some women are taking up the tasks traditionally performed by men as the need arises.
18. In general, gender inequalities within political, economic and social spheres are evident and are the result of structural, functional and cultural barriers to women's participation in public life. Gender identity is mediated through social positioning along the lines of cultural and socio-economic status, as well as the urban/outer island divide. Women are not a homogenous group and do not always share the same constraints and opportunities to participate in public life. The Government has taken measures to improve gender equality, most importantly through ratification of the Gender Equality Act in 2017. This Act defines the role of Government, political parties and businesses in bridging gender gaps in the political, economic and social aspects of life. Its enforcement is governed by a set of regulations to eliminate gender-based violence, combat discrimination and sexual harassment, provide equal opportunity and equal pay, and enhance women's participation in the labour force.
19. *Youth.* In the Maldives, the youth are defined as men and women aged between 18 and 34. The 2014 Population and Housing Census established that 47.5% of the population was below the age of 25. Literacy rates for the youth aged 15 to 24 are very high, with close to 100% literacy in Dhivehi and over 90% in English. The Census also found the proportion of men and women aged 15 to 34 who were not in education, employment or training to be high, particularly for women in the outer islands. Young people constitute a significant proportion of the labour force. More than half (54%) of the labour force is aged 18-34, while 23% is aged 15-24. The youth (18-34) unemployment rate was estimated at 8% in 2016.

c. Rationale for IFAD involvement

20. The Maldives Agribusiness Programme (MAP) aims to assist the Government of Maldives (GoM) address important elements of those Sustainable Development Goals (SDGs) that fall within IFAD's comparative advantage. In particular, it will address SDG 1 (no poverty), SDG 2 (zero hunger), SDG 5 (gender equality), SDG 8 (decent work and economic growth), SDG 10 (reduced inequalities) and SDG 13 (climate action).
21. In spite of economic growth over the past few years, the Maldives continues to be challenged by poverty and social and economic disparities, especially in the outer atolls and inhabited agricultural islands. In particular, the islanders of the northern atolls suffer from low incomes and high vulnerability.
22. There remains a strong need to increase crop productivity and production by generating knowledge through adaptive research, transferring technology to farmers, improving the efficiency of irrigation, and ensuring access to input supply, finance and markets. Although there have been efforts to raise the quality of crops, food safety remains a challenge. While the Government has developed the basic food safety and quality standards, these need to be enhanced in line with international norms. Furthermore, there is an evident concentration of women in processing, sorting and packaging activities across agricultural value chains, however, women do not have adequate access to technology, information, inputs and services to improve the productivity and marketability of output. Women's participation in public spheres, especially in community based organisations, is limited.
23. There is scope to increase value addition in agriculture through basic processing, sorting and packaging. As output is perishable, producers by necessity become price-takers. As a result, net returns to farming remain low. Improvements in processing would help improve livelihoods by raising returns and reducing the volatility of farm gate prices.
24. In line with the 2010-2025 Agricultural Development Master Plan, the programme will assist the GoM to strengthen and position the agriculture sector as the third driving force of the economy (after tourism and fisheries), expand livelihood options for rural people, increase incomes by enhancing employment opportunities, and improve food security and nutrition. In particular, it will support the Ministry of Fisheries, Marine Resources and Agriculture (MOFMRA) to refine and implement a comprehensive strategy for the agriculture sector based on a review of the Master Plan and contribute to the Agriculture Policy that is under development. As such, the programme's rationale is guided by the Government's strategic vision for the sector. It covers all six policy directions of the vision: (i) agricultural value chain coordination; (ii) food security and nutrition; (iii) ecological resilience; (iv) institutional support; (v) community empowerment; and, (vi) national and multisectoral partnerships. The rationale is further anchored in the draft National Fisheries and Agricultural Policy 2019-2029, and will take into account the information that will become available after the completion of the Agriculture Survey that is currently underway.
25. The programme is well aligned with IFAD's mandate of rural transformation and the strategic objectives of the Country Strategy Note (CSN) 2019-21. In line with the CSN, IFAD investment will facilitate farmers' access to improved services from the public and private sectors, and strengthen their productive capacity to meet market demand. In addition, it will strengthen extension services, increase yields for target crops, introduce climate change adaptation measures to strengthen farmers' resilience, improve processing and marketing services, and help increase farmers' incomes. The programme is aligned with the strategic objectives of IFAD's Strategic Framework 2016-25, in particular: (i) increase poor rural people's productive capacities; (ii) increase poor rural people's benefits from market participation; and (iii) strengthen the environmental sustainability and climate resilience of poor rural people's economic activities.

26. The programme will help address a number of challenges in the Maldives' agriculture sector. These are:
27. (i) limited progress in the implementation of Agricultural Development Master Plan;
28. (ii) fragile ecology and climate change vulnerability;
29. (iii) limited arable land, requiring adaptive technology for high productivity to overcome low soil fertility and quality, inadequate organic matter, and low water retention capacity;
30. (iv) limited water availability and threat of saltwater intrusion into groundwater;
31. (v) complexity and high cost of logistics;
32. (vi) dependency on imported high cost inputs and technology;
33. (vii) limited farmer knowledge combined with limited extension services;
34. (viii) limited compliance with standards for quality and safety of agricultural output; and,
35. (ix) lack of market access.
36. There are substantial opportunities for agriculture sector growth. The GoM is keenly intent to finalise its efforts for a comprehensive structured policy and incentive framework for the sector, as well as required investments and activities. Climate smart technological solutions suitable for the Maldives, which overcome land/soil constraints and mitigate against climate change, are available globally. The market for local crop production is potentially significant, considering that local demand is rising rapidly as incomes increase and consumers become more aware of nutrition and food safety considerations, and that the tourism sector imports substantial volumes of agricultural commodities per year.
37. The programme will support MOFMRA to refine its evolving vision and implement a structured policy and incentive framework for the agriculture sector, and provide investment resources to address the challenges and capitalise on the opportunities outlined above.
38. *Gender transformation.* MAP intends to be gender transformative as defined in the mainstreaming approaches of the IFAD Action Plan 2019-2025. While there is evidence of feminization of post-harvest activities in agriculture, this is not correlated with a subsequent increase in women's income, an improved access to training, or greater decision-making roles in community organisations. MAP will expand women's empowerment through better access to training and finance, and a greater role in community institutions particularly in decision-making positions.
39. *Nutrition focus.* MAP intends to be nutrition-sensitive as defined in the mainstreaming approaches of the IFAD Action Plan 2019-2025. Gender transformation will be complemented by a specific focus on nutrition outcomes for women and their households. As rural women are engaged in large numbers in home vegetable gardening for household consumption and sale at local markets; MAP will provide targeted interventions to improve nutritional outcomes for women and their communities.
40. *Climate resilience.* MAP intends to be harmonised with the mainstreaming approaches of the IFAD Action Plan on environment and climate change. Indeed, the focus of the programme is to promote agriculture that is environmentally sustainable and resilient to climate change.

B. Lessons learned

41. Since 1982, IFAD has invested in six projects in the Maldives valued at USD 46.4 million, of which USD 18.2 million financed by IFAD and USD 28.2 by partners and domestic sources. This concept note builds on lessons derived from these programmes, as well as the operations of development partners. It also benefits from the analytical work of IFAD's Independent Office of Evaluation (IOE), most recently the PCR validation of the Fisheries and Agriculture Diversification Programme (FADIP), which closed in September 2018. Key lessons of relevance for the programme are outlined below.
42. *Collective action.* Expectations regarding community organisations should be realistic. Collective arrangements have worked well when the benefits and costs are well defined, and ownership of the resource-generating assets is clear; they did not succeed in programmes which promoted joint ownership in formally registered cooperatives or companies. MAP will promote Island Farmers' Forums at island level for group-based extension using a link farmer approach and technology transfer, not for joint ownership in economic activities.
43. *Targeting women.* Evaluation work by IOE notes the potential for improvement of the IFAD Maldives country programme in promoting women's access to services. It recommends that, in order to mainstream women's participation, project design needs to include support for processing and other activities where women are mostly involved. Training should also be customized to the special needs of women with respect to location, timing and method of delivery. These recommendations have been taken on board in the design of MAP.
44. *Access to finance.* Previous projects such as FADIP and the Mariculture Enterprise Development Project (MEDEP) were unable to provide sustainable credit services for farmers or mariculture producers due to a combination of factors, such as strict collateral requirements by the lending institution (Bank of Maldives), lack of financial products adapted to credit purposes, unviable income generating activities (IGA) disconnected from the targeted supply chains, and absence of timely implementation support when challenges arose. The MAP will promote a number of financial products which overcome the collateral barrier, and will target IGAs whose operational and financial risks will be reduced by strengthened technical extension and connection to specific market segments. It will operate through the newly-established SME Development Finance Corporation (SDFC), a

specialized financial institution providing financial products and ancillary services to micro, small and medium-scale enterprises (MSMEs) and entrepreneurial start-ups for a number of sectors including agriculture.

45. *Access to markets.* Access to markets, and related facilitation of logistics, is fundamental for producers scattered across the remote island network. Previous projects which did not invest in market access, or which promoted marketing directly by the programme or public entities, did not succeed in creating sustainable market linkages. MAP will facilitate logistics and offer market choices to farmers, all of which are commercially driven by the private sector.
46. *Project management.* The importance of establishing robust project management capacity has been demonstrated by the experiences of IFAD and development partners in the Maldives. Management capacity has proven to be insufficient in relation to the demands placed on programme teams. In agreement with MOFMRA, the programme management team will be strengthened in terms of management skills and technical resources, and an external project management agency / technical assistance will be contracted to support the team.
47. *Project design.* Several design deficiencies were noted in FADIP and MEDEP due to insufficient contextual information available at the time, particularly related to value chain development. As a result, the role of cooperatives was over-estimated at FADIP design and proved unsuccessful during implementation. The implementation of MEDEP was challenged by targeting value chains in a relatively new mariculture sub-sector, and absence of in-depth value chain analysis before and during implementation. MAP will be designed based on a large body of relevant information now available, such as the National Fisheries and Agricultural Policy (2019-2029), the Household and Expenditure Survey (2016), the National Spatial Plan (2020-2040), the Gender Assessment of the Agriculture and Rural Sector (2018), and the five assessment reports of the Intergovernmental Panel on Climate Change (the last in 2015). Identification of potentially viable value chains is incorporated in MAP design, particularly in the testing and screening exercise under component 1 and the agri-business planning and market connection under components 2 and 3. This will be in close collaboration with relevant public and private stakeholders across the selected value chains.
48. *Coordination between IFAD and GoM* Previous projects, particularly FADIP, suffered from slow and difficult implementation also as a result of insufficient communication between IFAD and MOFMRA which delayed the resolution of implementation issues, while MEDEP was not supported by the timely provision of relevant technical expertise. This has been addressed with substantial strengthening of the relationship between the two parties, which has been made possible by IFAD's operational decentralization and placement of the country team in the same sub-region and similar time zone.

2. Project Description

C. Project objectives, geographic area of intervention and target groups

49. **Goal and objective.** The programme's goal is to sustainably increase the incomes, food security and nutrition status of small farmer households. Its development objective is the strengthened enabling environment for sustainable and climate-resilient agriculture. This objective will be achieved through reformed policies, strengthened institutions and services, enhanced agricultural technologies, and better access to financing and markets for small farmer households, with an over-arching goal of gender transformation.
50. **Geographic area.** GoM is presently developing a National Spatial Plan (2020-2040) with the objective of reducing disparity among the capital and regions, facilitating effective regional development, providing affordable transport connections to communities, promoting economically sustainable infrastructure development and improving island-level livelihoods to create prosperous societies. The Spatial Plan will be based on growth hubs with the Malé area being the central hub and five regional hubs, nine sub-regional hubs, three central clusters and six satellite clusters. MAP will be articulated within the National Spatial Plan as part of the alignment with Government development strategies.
51. The programme will be nationwide in scope, articulated within the Spatial Plan, covering all regional and sub-regional hubs, clusters and islands where agriculture is undertaken by small farmers. Investments will initially be focused in the northern atolls, where poverty and vulnerability among the farming communities is greater, in alignment with the Spatial Plan.
52. *Component 1 of Enabling Policy, Institutions and Services* will initially focus on regions 1-3 covering 3 atolls consisting of 26 inhabited agriculture islands and 6 uninhabited active commercial agriculture islands. Subsequently, it will be expanded to become nationwide in scope across all 19 atolls and 21 regions. At full development, Component 1 will cover 98 inhabited agriculture islands and 50 uninhabited active commercial agriculture islands, of which 24 are actively producing crops.
53. *Component 2 of Climate Smart Production* will focus on regions 1-3 covering 3 atolls consisting of 26 inhabited agriculture islands and 6 uninhabited active commercial agriculture islands.
54. *Component 3 of Market Connection* will initially focus on regions 1-3 covering 3 atolls consisting of 26 inhabited agriculture islands and 6 uninhabited active commercial agriculture islands during the first two years. It will subsequently expand to regions 4-7, and finally cover the whole country.
55. The main hubs for programme activities in region 1-3 are Haa Alif Hoarafushi for region 1, Haa Dhaalu Vaikaradhoo for region 2, and Shaviyani Milandhoo for region 3. These hubs will serve 8, 9 and 9 inhabited agriculture islands respectively.
56. **Target groups.** The programme's target group consists of small farming households. They include women, men, and youth belonging to households of different socio-economic categories. With a considerable socio-economic and socio-cultural divide

between rural and urban populations, also with respect to gender and age, small farmers who depend mainly on agriculture for their livelihood are economically one of the most vulnerable groups in the country. Analysis of poverty correlated with economic sector indicates that those working in agriculture and fisheries are far more likely to be poorer than those in industry or services.

57. *Women* continue to have important roles in agriculture, and are key actors for achieving food security and improving nutrition. The programme will pay special attention to ensuring equal opportunity for women in all activities and investments – management, planning, decision making, participation in training, access to inputs, technology, financing, services and markets, and access to an equal share of social, financial and economic benefits. Support to participating individuals will be inclusive and gender sensitive. A detailed gender strategy will be defined at start-up, and an associated action plan elaborated and implemented. The strategy will define a set of actions to achieve the following: (i) increase gender awareness for programme staff, participating agencies, service providers and business partners at all levels; (ii) integrate gender analysis and gender-disaggregated targets and data into planning, monitoring and reporting; (iii) ensure women have equal opportunities to assume leadership positions in Island Farmer Forums and as Extension Link Farmers (ELFs); and (iv) increase the opportunities for rural women to access agriculture resources and services.
58. *Youth* in the Maldives are motivated and dynamic. They are an important segment of the target group, as their engagement is crucial for the future of agriculture in the country. Field visits suggest that the youth constitute about 20% of the labour force in rural communities. Considering that MAP will promote modernised, technologically advanced forms of agriculture, efforts will be made to specifically and systematically target young farmers, particularly those inclined to adopt advanced production techniques. MAP will explore opportunities to engage the youth in agribusiness development, agri-technologies and knowledge transfer, modern agriculture management, market linkages and IT technologies in support of production and post-production management. As concrete measures: (i) youth participation will be recorded and reported in the M&E system; (ii) youth will be encouraged to take active part in adoption of technologies and compliance with Maldives Good Agricultural Practices (MGAP) under components 1 and 2, (ii) youth will be given equal access to opportunities as Island Farmer Forum leaders and ELFs; (iii) youth will be encouraged to take an active part in production and marketing where modern technologies and IT tools are introduced.
59. *Migrant workers*. It is estimated that over one-fourth of the population in the Maldives is composed of migrant workers coming from overseas. Migrants work throughout the economy, particularly in tourism, construction and services, but also in fisheries and agriculture. In the agriculture sector, migrant workers are heavily involved in both production and marketing, and are increasingly renting agriculture land. However, they are currently excluded from extension and other services. In light of their importance in the sector, MAP will ensure the inclusion of migrant workers in training activities and extension services.
60. **Targeting strategy**. In light of the above, the programme's targeting strategy is outlined below: The targeting strategy will be implemented through specific measures integrated within each component.
 - *Geographical targeting*. Nationwide programme with the core of investments initially focused in the northern atolls where poverty and vulnerability among the farming community is greater.
 - *Sectoral targeting*. Targeting of all small farmers in the country, as well as relevant agriculture-related value chain participants (input suppliers, traders, marketers, transporters, retailers, wholesalers, commercial islands).
 - *Inclusive targeting*. Specific measures to ensure inclusion direct targeting of women-headed households, women farmers, and young farmers; and ensuring access of migrant workers in training and extension services.
 - *Enabling environment*. Fostering of an enabling environment of equal opportunity for women, men, and youth for their meaningful participation in decision-making, implementation, and the flow of benefits; and ensuring relevant actions are in place to optimise women's benefits from programme services.
61. The estimated numbers of beneficiaries per component are outlined below:
62. (i) *Component 1 of Enabling Policy, Institutions and Services* will directly target 6,000 small farm households, and indirectly target 4,170 small farm households. The total number of beneficiary households will be 10,170. Of the farmers targeted, 53% will be women and 20% youth.
63. (ii) *Component 2 of Climate Smart Production* will directly target 2,795 small farm households. Of the farmers targeted, 53% will be women and 20% youth.
64. (iii) *Component 3 of Market connection* will directly target 2,795 small farm households and indirectly target 7,375 small farm households. The total number of beneficiary households will be 10,170. Of the farmers targeted, 53% will be women and 20% youth.

65. Table 1: MAP Targeting by Component

Component	Directly Targeted				Indirectly Targeted			
	Registered Farm HHs		Non-registered Farm HHs *		Registered Farm HHs		Non-registered Farm HHs *	
	#	Ha	#	Ha	#	Ha	#	Ha

1	6,000	615	0	0	1,800	185	2,370	4,402
2	2,150	220	645	1,198	0	0	0	0
3	2,150	220	645	1,198	5,650	580	1,725	3,204

66. Source: Ministry of Fisheries, Marine Resources and Agriculture

67. * Non-registered farmers include commercial islands

68. *Island Farmer Forum.* The key instrument for ensuring community participation, targeting small farmers and promoting equal opportunity and inclusion will be the Island Farmer Forum in each inhabited agricultural island. Each participating island will establish a Forum on a consultative and participatory basis, with equal representation of women, men and the youth. This Forum will represent the island in its interface with MAP and with services, financing, logistics and markets. It will participate in annual work planning/budgeting, implementation, and monitoring. It will also build a network of women participants, including gender exchange activities with Island Councils and Regional Farmer Forums. MAP will ensure that at least 40% of Island Farmer Forums, and at least 33% of Regional Farmer Forums, are led by women.

69. *Regional Farmer Forum.* The main instrument for ensuring farmer participation in policy dialogue and advocacy will be the Regional Farmer Forum. Each of the three targeted northern regions will establish a Regional Farmer Forum composed of the representatives of the Island Farmer Forums in the region. A representative of each Regional Farmer Forum will represent its farmers/islands in the high-level MAP steering committee.

70. It is envisaged that Island and Regional Farmer Forums will improve the prospects for sustainability of MAP investments and activities. Guidelines and procedures for establishment, management and operation of the Island and Regional Farmer Forums will be detailed by programme management, supported by technical assistance, at the start of implementation. These procedures will be subject to review and clearance by MOFMRA and IFAD.

D. Components/outcomes and activities

71. The programme will support agriculture and agribusiness development in the Maldives by investing in the generation and transfer of modern climate-smart agricultural technologies which are tailored to respond to identified market opportunities. This will be achieved through three inter-linked components: (i) enabling policy, institutions and services; (ii) climate-smart production; and, (iii) market connection. The operational approach is to focus on high value commodities with market demand and growth potential, cluster investments in the northern regions to facilitate scale and logistics, apply the group-based ELF approach together with Information and Communication Technology (ICT) for knowledge and technology transfer, link organised farmers with markets, and provide access to appropriate financial products.

a. Component 1: Enabling policy, institutions and services

72. The expected outcome of this component is the development of the enabling policy, institutional and service provision environment that will allow increased productivity and production of agricultural commodities demanded by the market.

73. The Government is in the process of setting up a public company – the Maldives Agro Corporation (MACO) – that will strengthen the capacities of farmers and their organisations to engage in profitable agribusiness. It will be mandated to ensure availability and supply of high-quality consumable inputs, equipment and machinery for the agricultural sector. MACO will also develop mechanisms to ensure the competitiveness of domestic production compared with imports. The project will build the capacity of MACO to deliver services to small farmers, such as input supply, extension and training, introduction of food quality and safety standards, and technology transfer. Modern technologies adapted to local conditions for transfer to farmers will include greenhouses, hydroponic systems, drip fertigation systems, and grafting equipment. MACO staff will be trained in selection, quality control and supply of inputs and equipment required by small farmers for modern production systems, and in dissemination of MGAP protocols in conjunction with sustainable, climate-smart input management. Support will also be provided to refine the policy framework and strengthen the institutional capacity of MOFMRA and its Agriculture Research Centre (ARC) in Hanimadhu Island.

74. Production technologies and MGAP will initially be transferred to the 26 inhabited islands and 6 uninhabited commercial agriculture islands in regions 1-3. These islands will be clustered around 3 hubs: (i) Haa Alif Hoarafushi for region 1; (ii) Haa Dhaalu Vaikaradhu for region 2; and, (iii) Shaviyani Milandhu for region 3. Programme activities under each hub will be supported by an agriculture advisor from MACO trained by the project.

75. In each inhabited agricultural island, the Island Farmer Forum will be the focal point for decisions on crops to be produced, and will appoint an Extension Link Farmer (ELF) as the focal point for interacting with extension services and sharing knowledge with other farmers at island level. The ELF will also serve as input retailers. They will receive technical training and financial support to establish agricultural input retail enterprises at island level. Results from ARC's adaptive research will be validated through field trials/demonstrations in a representative island under each hub; the ELF from these islands will be trained in conducting on-farm trials and demonstrations, farmers field schools and farmers field days. At least 40% of ELF will be women.

76. This component will directly benefit 2,150 farming households across the three northern regions, and migrant workers who are hired as farm labour or who operate on rented land. It will also generate financial benefits for six commercial islands, three regional markets, one wholesale market in Malé, and four wholesale companies. Furthermore, it will create greater national impact, as 3,850 farming households in other regions will be supported by MOFMRA and MACO applying the same Island Farmer Forum and ELF methodology.
77. **Subcomponent 1.1. Knowledge and technology**
78. **Output 1.1.1.** Policy knowledge products on sustainable and climate-resilient agriculture will be completed (research, study, strategy, bylaw) based on relevant thematic and sector analysis, and will be applied to promote an enabling environment for agriculture.
79. MAP will enhance the participation of the agribusiness community in policy processes. This will promote the inclusion of agribusiness players, supporters and influencers in policy formulation processes with regulators such as MOFMRA. Thematic and sector issues of strategic interest will be discussed with agribusiness stakeholders (input suppliers, farmers, traders, transporters, processors, wholesalers, retailers) to ensure responsiveness to their concerns. Partnership with policy research entities will be established in order to carry out relevant research in support of policy formulation. Technical assistance and training will be provided as appropriate. Relevant topics may include: (i) methods to link MSME financing to production and markets; (ii) operational procedures for distribution and application of quality inputs; (iii) regulations governing compliance with MGAP, certification and traceability; (iv) regulations governing groundwater extraction; (v) regulations governing the import of agriculture commodities; (vi) procedures to establish an ISO 17025 accredited laboratory for analysis of pesticide and heavy metals residue; and (vii) guidelines on the safe handling, use and disposal of agricultural chemicals. All policy and institutional strengthening work will mainstream climate change, sea level rise and natural hazard issues and impacts.
80. MAP will support MOFMRA to refine and implement a comprehensive strategy for the agriculture sector based on a review of the Master Plan, and to contribute to the Agriculture Policy that is under development. The MAP management team, supported by TA, will be at the forefront of identifying and prioritizing the policy revisions required to strengthen the sector and ensure that results achieved under MAP and other interventions are sustained. The programme will act as the secretariat of, and guide the senior leadership of the MOFMRA, in its policy-making process that is already in place and is structured around twice-weekly meetings. Participants in this process include all section heads and project directors under MOFMRA. This is the primary forum within MOFMRA that identifies the needs for policy interventions. MAP will also participate actively in the technical committee on agriculture that is chaired by the Permanent Secretary in order to guide and influence relevant Government policies. This will be done by undertaking policy research, preparing policy papers, organizing policy dialogues, and making policy recommendations that are based on evidence generated by MAP at the national and atoll levels. In order to ensure meaningful stakeholder engagement and to coordinate policy and development work, MAP will formulate coordination mechanisms with other development projects such as the Water Project funded by the Green Climate Fund, and the Sustainable Fisheries Resources Development Project and Maldives Clean Environment Project funded by the World Bank. Regional Farmer Forums established by MAP will be actively consulted on policy issues.
81. In addition, MAP will support the Government in organizing the next *Maldives Partnership Forum*. This Forum provides a platform to discuss development priorities, seek partnerships and investments for the development agenda, and formulate plans with bilateral and multilateral partners. It covers themes ranging from the blue economy to sustainable and inclusive development, and fosters the concept of its status as an island economy.
82. **Output 1.1.2.** The capability of ARC in Hanimadhu Island to generate climate resilient knowledge and technology will be upgraded. Adaptive research and testing will be organised at ARC and on farmers' fields (particularly for root crops, cereals, and inter-cropping within coconut plantations). Testing will cover selected commercial seed varieties for the types of vegetables cultivated and imported; selected planting materials for nut and tree crops; grafting of selected varieties of tomato, passionfruit, melons, mangoes, guava and papaya on selected root stock; and, cropping systems for coconuts, and cover crops for coconuts for fertilization and compost production. On this basis, production packages will be configured for adoption by small farmers using own equity, purchase-hire, and/or debt financing. Island Farmer Forums will be actively consulted in developing the research agenda.
83. Investments for ARC in Hanimadhu Island will include: (i) new facilities for examining water, soil, tissue and plant diseases; (ii) greenhouse for humid and hot climate hydroponic systems; (iii) insulated house with vertical production under artificial light; (iv) different types of net houses; (v) machinery and apron for compost-making; (vi) open field hydroponic systems; (vii) reagents for analysis, fertilizer, and pest control agents (chemical and biological); (viii) tools such as refractometers, tissue and soil nutrition analysis meters, insect catch plates and microscopes; (ix) open field drip irrigation; (x) HDPE drain cell/storage and rainwater collection sheets with pump sump and pillow water bladder storage tank; (xi) grafting equipment; (xii) irrigation technology for home gardens to ensure food security and nutritional diversity as well as contributing to decreasing women's workload; and, (xiii) photovoltaic systems with battery backup. All facilities will be flood-proofed in design and construction.
84. MAP will provide technical assistance for the development of ARC's adaptive research programme, the knowledge required for specific crops, and modern production systems. Equipment suppliers will be contractually responsible for installation and for providing initial training to ARC staff in the use of the equipment provided, with subsequent refresher training to be provided by the Maldives National University and contracted service providers as appropriate. For the transfer of production technologies to farmers, ARC will train MACO agriculture advisors, dealers/input suppliers, extension link farmers, and farmers interested in investing in these technologies.
85. **Output 1.1.3.** Packages of recommendations for increasing financial returns and enhancing resilience to risks will be developed for small farmers. Adaptive research will focus on: (i) best varieties of various crops; (ii) hydroponic fertilisation for greenhouses, closed systems and field systems; (iii) drip fertigation for open fields; (iv) compost use for crop production in open fields; (v) IPM and organic pest recommendations for various crops in greenhouses, closed systems and open fields; and (vi) relevant farm

budgets and calendars based on field records.

86. MAP will provide technical assistance and training to ARC staff for conducting on-station adaptive research and off-station validation trials, assessing farmer acceptability, and studying the nutritional and market impact of well-performing varieties. Tested technologies will be evaluated jointly by ARC and farmers on the three selected test islands prior to widespread dissemination. Evaluation will be based on well-prepared protocols measuring parameters related to yields, palatability, use of water from aquifers, harvested rainwater, pesticide use and effect on the environment and overall ecological footprint.
 87. MAP will deploy technical assistance to help ARC develop a knowledge management strategy and methodology. ARC will prepare promotional materials, videos, pamphlets, and prospectus for technologies being promoted, and publish its findings and recommendations on its webpage. Attention will be devoted to detailed production guides and financial analyses.
 88. **Subcomponent: 1.2: Input supply**
 89. MAP will provide technical assistance to MACO to develop its management capacity, its business planning, and its strategy for scaling up and sustainability. It will support MACO to import and distribute appropriate high quality inputs such as planting material and initial rootstock for grafting, fertilizer and pest control agents for conventional and organic production; power tillers and implements; tropical natural ventilated and forced ventilated green/screen houses with water harvesting systems; and hydroponic growth vessels with shade nets, solar/ photovoltaic systems, drip fertigation and water harvesting liners. It will assist MACO to procure simple processing equipment for commodities such as coconut chips and UHT coconut water, pickles, jam and juice. MACO will sell these inputs and equipment to farmers, ideally at market rates. MAP will provide the initial capital to MACO to procure an initial stock of inputs and equipment; MACO would thereafter operate the scheme on a financially sustainable basis. MACO will further explore the possibility of procuring some inputs locally (for instance organic inputs, seeds, planting material and compost).
 90. **Output 1.2.1.** New technologies and improved inputs will be transferred to small farmers. MAP will support MACO to recruit and train six agronomists/extension staff. These staff will create awareness of the programme at island level, help to establish the Island Farmers' Forums for decision-making on types of produce to ensure scale of production, and provide training to ELFs. MAP will also provide technical assistance to develop commodity-specific MGAP protocols as well as handbooks for MGAP implementation, and to develop a set of master MGAP trainers to be appointed by MOFMRA.
 91. MACO personnel will be trained in the validation of adaptive research results and the provision of advisory/extension services applying the ELF group-based model. MACO staff will support ARC in conducting field validation trials/demonstration, which will provide them with in-depth knowledge of new technologies being extended. MACO will also support ARC to provide training to ELFIs in production techniques, MGAP compliance, financial literacy, water management, and business planning.
 92. ELFIs will have dual roles as island level extensionists and input retailers. For group-based extension functions, ELFIs will receive training in extension methods, farmers' field schools, input application, use of equipment, modern production systems, and MGAP compliance. As input retailers, ELFIs will be trained in inventory management, distribution/retail management of capital goods and consumable inputs, business aspects of operating a retail outlet, and technical aspects of the application of inputs and use of capital goods. Safeguards will be developed to ensure proper separation of ELF input supply and extension functions, such as certification mechanisms with code of conduct and verification by MOFMRA and Island Farmer Forums, traceability of inputs for accountability and food safety, and compliance of use of fertilisers and pesticides with publicly available documentation published by ARC.
 93. **Output 1.2.2.** An Agriculture Information and Communication Technology (AICT) service will be established. MAP will contract a service provider to establish an AICT platform and data bank, and to develop a mobile app for providing real-time market information and agricultural advisory services to farmers. The app will incorporate a marketing module for transactions among input suppliers, producers and buyers. Income from traffic on the app will be shared in order to ensure sustainability.
- b. **Component 2: Climate-smart production**
94. The expected outcome of this component is the increased productivity and production of agricultural commodities demanded by the market. Further to the training and technology transfer organised under component 1, farming households in regions 1-3 will begin to receive the services under component 2 from PY2 onwards.
 95. **Output 2.1.** Climate-smart production of high-value commodities by small farmers will be increased through the application of improved inputs, equipment and modern technologies. Farmers will be supported to apply inputs supplied by MACO (through ELFIs), seeds and technologies/production packages provided by ARC, and agricultural financing from selected financial institutions. Irrigation water supply will typically come from investment in rainwater harvesting schemes. Farmers will apply modern production techniques, MGAP standards, *Codex Alimentarius* and preliminary steps to HACCP if required, branding, sorting and grading, quality control, aggregation, and basic processing for value addition where applicable. Islands with substantial aggregation of output may be supported with hybrid (solar/battery) pre-cooling facilities depending on demand.
 96. A gender-responsive approach will be adopted for climate-smart production technology, to ensure that it also meets the particular needs, priorities, and realities of women, so that both men and women can equally benefit from new technology. As resilience-enhancing practices and approaches are developed, information will be made available and discussed with women farmers to mitigate any potential increases in workload. Eventually, this gender-responsive agriculture model may generate evidence of impact on women's productivity and empowerment, and could be proposed to MOFMRA for scaling up.
 97. Home gardens will be the entry points for improved dietary diversification of families on the islands. MAP will support farmers to cultivate and consume more nutritious foods in climate-resilient ways. Home gardeners will be trained in improved soil and water management and the use of better planting materials. This will be complemented by direct support for improving the root crops and tree crops that are part of traditional household food production systems, but are at low productivity levels or compromised

by changing climatic conditions. Educational and food-preparation materials and training will address issues of behaviour, consumption choices and nutritional awareness, including information on dietary diversification and good diet practices at the household level.

98. Farmers will be supported to comply with MGAP. MACO extension staff will develop a training schedule based on the MGAP crop protocols and mentor ELF's to pass on the training to farmers. Farmers will initially receive training for the selected high value commodities, followed by training on MGAP leading to audit and certification. Migrant workers who are hired by farmers or who undertake production on rented land will also receive training and other project services.
99. Farmers, in particular women farmers, will also be trained in aggregation and post-harvest management of the selected high value commodities demanded by the market. A service provider would train producer households in food preservation, such as conversion to purees, jams and pickles. This could be an activity on inhabited agriculture islands as well as commercial islands. Grading and sorting produce according to cosmetics and qualities according to *Codex Alimentarius* will ensure a uniform product for the market, allowing competition with imported produce. This will also feed into branding of produce from Maldives.
100. Other forms of production-related training for farmers will include: (i) climate-sensitive cropping and water management; (ii) operation and maintenance of greenhouses, closed vertical production systems, hydroponic systems, open field drip and hydroscopic systems, walking tractors, and photovoltaic systems; (iii) installation and maintenance of water harvesting and storage systems; (iv) irrigation technology for home gardens; (v) precooling, refrigeration, hygiene, and maintenance of cold storage facilities; (vi) compost production and application on open fields, with adjustment for chemical fertiliser application accordingly; (vii) mulching using compost and biodegradable polythene; and, (viii) grafting to improve climate resilience (resistance to pest and disease, and improved heat tolerance).
101. **Output 2.2.** Island Farmer Forums' capability to provide the required quantity and quality of produce in response to market demand will be enhanced. These Forums will serve as the focal point for appointing ELF's, selecting commodities to be produced and staggering their production, introducing MGAP and certification, creating links with financial institutions, aggregating produce for marketing, developing linkages with markets, and organising contract farming arrangements with commercial agriculture islands, tourism resorts, wholesalers in Malé, and MACO. Technical assistance will be provided to each Forum to undertake these activities.
102. **Output 2.3.** Small farmer access to agriculture financing will be improved. On the supply side, MAP will collaborate with SDFC and MFLC to build their operational capacities and increase their agribusiness lending portfolios. Specifically, MAP support will include: (i) technical assistance for developing new financial products where required; (ii) training relevant SDFC and MFLC staff in using the new financial products; and, (iii) training relevant SDFC and MFLC staff in business plan assessment and loan appraisal. SDFC and MFLC will also be supported to provide diversified agriculture financing products, such as value chain financing (tri-partite arrangement involving financial institution, producer, and buyer where the forward contract serves as collateral and loan repayments are made by the buyer on behalf of the borrower), receivable financing (where a company uses its receivables as collateral in a financing agreement), and supplier or inventory credit and insurance. The feasibility of introducing mobile technology-based payment services will also be explored.
103. As SDFC is still in its early operational phase, its financial services to the MSME sector in terms of range and coverage are still limited. MAP will invest in improving and increasing SDFC's agriculture and agribusiness lending portfolio. MAP will also collaborate with MFLC for hire purchase products for vessels with cold storage facilities (eight vessels estimated) and cold storage facilities (five regional/sub regional facilities estimated).
104. On the demand side, MACO staff will support farmers and enterprises develop business plans. Poorer farmers with lower incomes and higher vulnerability (some 15% of the target group), with priority focus on women farmers, will be eligible for matching grants to substitute their 20% equity contribution for accessing SDFC loans, with clear selection criteria outlined in the PIM, while the remaining farmers will contribute their own equity. Based on demand analysis and financial modelling, it is projected that SDFC will finance USD 7.5 million of loans, of which USD 5 million as incremental financing and USD 2.5 million through reflows.
105. Programme management will support the preparation of feasibility studies/business plans for the estimated eight enterprises investing in cargo vessels with cold storage and the five enterprises investing in regional/sub-regional cold storage facilities. These thirteen enterprises will be identified and selected by in a competitive manner and their financial viability duly analyzed by MFLC. They will be eligible to receive 20% matching grants as down payment for their investments through hire purchase products from MFLC. MFLC will be the legal owner of the assets until the hire purchase arrangement has matured; thereafter, ownership will be transferred to the investor.

c. Component 3: Market connection

106. The expected outcome of this component is the development of market linkages and upgraded transportation logistics among organised producers and buyers. Four marketing channels will be offered to Island Farmer Forums:
 1. *Wholesale markets at regional hubs, sub-regional hubs, and central/satellite clusters* MAP will invest in post-harvest management and processing at island level, and cold storage facilities at sub-regional or regional hub level. These wholesale markets will partially meet decentralised domestic demand, with positive effects on food security and nutrition for atoll/island inhabitants. Their linkages with the central (Malé) wholesale market and tourism resorts will also be upgraded.
 2. *Commercial agriculture islands*. These islands produce high value commodities for sale to the tourism sector. While they have established marketing channels to resorts, they are currently able to meet only a small fraction of demand. MAP will link commercial islands with organised farmers on inhabited agriculture islands for contract farming arrangements.
 3. *Central (Malé) wholesale market*. MAP will facilitate logistical arrangements for the cold-chain transport of

- aggregated output from organised farmers to the central wholesale market in Malé;
4. *Tourism resorts.* MAP will facilitate the development of market linkages among organised farmers and tourism resorts.
107. At wholesale market level, MAP will support private enterprises interested to establish cold storage facilities at the three regional or sub-regional hubs. This support will be in the form of assistance to obtain MFLC or SDFC loans, matching grants (with detailed eligibility criteria and operating procedures spelled out in the PIM), technical training in cold storage management, and compliance with food safety standards. Any cold storage facilities will be flood-proofed.
108. At commercial agriculture island level, MAP will support contract farming arrangements with organised farmers in inhabited agriculture islands. The commercial islands will be offered incentives in the form of: (i) assistance to obtain MFLC or SDFC loans; (ii) matching grants for investments in cold storage on cargo vessels (under output 2.3 above), thereby expanding their purchasing logistics capabilities and allowing purchase and transport of produce from inhabited agriculture islands to markets; (iii) upgraded production facilities on the commercial island to be used as training facilities for farmers; (iv) cost-sharing of embedded supply chain managers, on a declining basis, to provide specific training and inputs (where needed) to contracted farmers on varieties, production techniques, quality control, sorting and grading, and proper handling; and, (v) training in MGAP compliance.
109. In regions 1-3, the average distance between islands and hubs is 21 km, while the longest distance is 56 km; and the average distance from the northern hubs to Malé is 275 km. With the projected incremental production of agriculture commodities in these regions, an additional four refrigerated vessels will be required, each with 120 DWT cold storage capacity, to move produce to central, regional and sub regional markets. MAP will support interested *dhoni* owners to upgrade their vessels with cold storage through assistance to link with MFLC or SDFC, matching grants (detailed in the PIM), and provision of MGAP training/certification. To qualify for this support, a *dhoni* owner will be contractually bound to service a specific number of inhabited agriculture islands on a pre-agreed regular basis.
110. When the remaining regions are included in the market arrangement, an additional eight vessels are required. It is envisioned that market forces will ensure that the demand for refrigerated cargo service is met with limited interventions from the public sector when the market connections are expanded beyond the initial three regions. If still a need for additional transport services during third year of implementation, MAP can reallocate funds for procuring up to three refrigerated vessels to be owned by MACO.
- E. Theory of Change**
111. More than 10,000 small farm households practising agriculture as registered or non-registered farmers face continued challenges in terms of limited cultivable land areas, lack of access to modern technologies and knowledge to enhance productivity and production, and costly logistics for market connection. This is particularly severe for the 2,870 farming households in the northern atolls in regions 1 –3, where MAP will directly invest in agricultural production and market linkages. Farming in the programme area is mostly practiced in an unorganized manner and at limited scale. Small farmers in the outer atolls suffer the most in terms of periodic food insecurity and poverty. The absence of organized agriculture data also hinders the orientation of public and private investments in the sector. As result, the country has relied heavily on imported agricultural produce and foods.
112. The challenges outlined above have affected the agricultural development in the Maldives, leading to a number of risks such as: (i) declining performance of the agricultural sector that could disappear if the trend is not reversed; (ii) reduced national food sovereignty due to extreme reliance on imports; (iii) lack of well-oriented strategic investments from the public and private sector; (iv) reduced quality and quantity of natural resources for agriculture; and (v) crowding out of local producers due to low cost-effectiveness of agribusiness logistics.
113. Furthermore, despite the increasing feminization of post-harvest activities, there is little evidence of an increase in women's incomes, participation in training, or decision making roles in community organisations. Women are affected by lack of access to technology, finance and leadership roles, with a disproportionate impact on their economic empowerment. Lack of access to productive assets and knowledge also translates into low productivity. This challenge is compounded by the lack of nutrition security, particularly among women and children. The detrimental impact of micronutrients insufficiency on women's productivity is well established.
114. Despite these challenges, there is robust potential for agriculture growth. National efforts are underway to develop a comprehensive and structured policy and incentive framework for the sector. In addition, the Government is considering related investments and activities. Internationally tested and practised climate change mitigation and adaptation technologies and solutions that are suitable for the Maldivian context can be introduced to overcome soil and water management issues. With the steady growth of the economy, the demand and the size of the local market for agricultural output is rising rapidly. With enhanced incomes, consumers are becoming increasingly more aware of nutrition and food safety issues. Furthermore, the tourism sector imports substantial volumes of agricultural commodities per year that could be supplied by the domestic producers.
115. The MAP theory of change is premised on a proactive approach to synergistic investments that build and strengthen the responsiveness and competitiveness of small farm households in organized production, processing, preserving and marketing, supported by the adoption of sustainable and climate-smart technologies and practices. It is based on the assumptions that: (i) small farmers involved in enhanced crop production, post-production management and marketing would benefit from inclusion in a sustainable and business-oriented model; (ii) selection of high value commodities, supported by demand-driven research and improved technical services, would offer small farmers the opportunity to enhance production and meet market demand; (iii) improved management of natural, physical and financial resources would allow small farmers to strengthen climate resilience of production and reduce vulnerability to climate change; (iv) enhancing nutritional status and gender relations at household and community levels as well as policy engagement on specific issues (equal voice and equitable workload for women and opportunity to influence gender responsive policies) will improve agricultural growth; (iv) access to improved technology and a participatory gender approach will also ensure reduction in workload of women; and, (v) strategic investments in these areas

would contribute to achieving the Agricultural Development Master Plan and generate sustainable increase in the incomes, food security and nutrition of small farmer households.

116. MAP will therefore invest in a number of strategically interlinked priorities – developing the enabling environment of policy, institutions and services, enhancing the climate-smart production of high value commodities, and upgrading market connections between producers and a range of markets. The expected outcomes are an improved policy and incentive framework for the sector, increased productivity and production of agricultural commodities demanded by the market, and development of market linkages and upgraded transportation logistics among organised producers and buyers.

F. Alignment, ownership and partnerships

117. *Alignment with national policy.* In line with the 2010-2025 Agricultural Development Master Plan, MAP will assist the Government to strengthen and position the agriculture sector as the third driving force of the economy, expand livelihood options for rural people, increase incomes and enhance employment opportunities, and improve food security and nutrition. In addition, it will support MOFMRA to refine and implement a comprehensive strategy for the agriculture sector based on a review of the Master Plan and contribute to the Agriculture Policy that is under development. As such, the programme's rationale is guided by the Government's strategic vision for the sector. It covers all six policy directions of the vision: (i) agricultural value chain coordination; (ii) food security and nutrition; (iii) ecological resilience; (iv) institutional support; (v) community empowerment; and (vi) national and multisectoral partnerships. The rationale is further anchored in the draft *National Fisheries and Agricultural Policy 2019-2029*. MAP will also take into account the information and analysis that would eventually become available after the ongoing national Agriculture Survey is completed.
118. *Alignment with IFAD policies* MAP is well aligned with IFAD's "*Approach in Small Island Developing States*" paper published in 2014. It will invest in two of the three identified priority areas: (i) opportunities and employment for smallholder agriculture; and (ii) environment and climate change. The programme addresses three of the four identified operational programme management areas: (i) public-private-producer partnerships; (ii) additional investment and financing; and (iii) technical assistance. Furthermore, MAP is aligned with IFAD's rural transformation agenda, the *IFAD Strategic Framework 2016-2025*, and the objectives of the 2018 Country Strategy Note (particularly farmers' access to services and markets, and climate change adaptation interventions). MAP is also aligned with IFAD's Transition Framework as evidenced by the gradual phasing in of the lending terms and conditions, and the substantial emphasis on policy engagement. Its mainstreaming themes are informed by IFAD's thematic Action Plans on gender transformative approaches, nutrition mainstreaming, youth action, and environment and climate change.
119. *South-South and Triangular Cooperation (SSTC)* MAP will support MOFMRA to share experiences, best practices, innovations and solutions with other SIDS on small island agriculture and climate change adaptation for small farmers. Options for cross-learning, exchange of expertise, and promotion of greater institutional links will be explored. The outcomes may also help inform the design of future development investments in SIDS. Synergies will be developed with IFAD-financed investments in other SIDS, in particular in the Pacific. MAP will also inform the Maldives' participation in the SIDS Action Platform set up by the Third International Conference on SIDS in 2014. In addition, MAP will consider application of the lessons learned from the first generation of IFAD's SSTC initiatives, such as, the *South-South Cooperation for Scaling up Climate Resilient Value Chains Initiatives* project. Furthermore, MAP will also study how IFAD's SSTC Strategy has supported the mainstreaming of IFAD's main thematic areas of work, namely, climate change, nutrition and gender, and apply the strategic principles to achieve results under the MAP activities focused on these thematic areas.
120. *Ownership.* MAP responds directly to the national *Strategic Action Plan 2019-2023* in the area of agricultural development and addresses several policy interventions, such as strengthening agricultural value chains and the productive capacities of farmers, increasing the role of agriculture in achieving food safety and food security, mainstreaming sustainable agricultural practices, and strengthening institutional coordination, the policy and regulatory framework, and availability of relevant data. MAP will contribute to agribusiness development and related business models that MOFMRA as lead implementing agency is seeking.
121. *Partnerships and RBAs.* MAP will actively seek collaboration with development partners, and participate in stakeholder consultation platforms in the country. The programme will build on research generated by WFP and FAO on nutrition, as both institutions have developed a substantial knowledge base in this area, and synergies will be developed with FAO-led platforms on extension, food safety, livelihoods and marketing. Complementarity with other development initiatives will be activated through the annual *Maldives Partnership Forum*, which provides a platform for policy, investment coordination, and partnership fostering, and relevant donor coordination meetings. MAP will also explore partnerships with the private sector (e.g. Maldives National University, MFLC and other financial institutions), agencies engaged in Good Agricultural Practices, and relevant organisations operating in the field of rural enterprise development.
122. *Specific programmatic synergies.* In its efforts to promote an island-specific integrative approach, MAP will define collaborative approaches with relevant national programmes in particular with respect to solid waste, integrative water management, and climate adaptation interventions. MAP will seek to develop synergies with the World Bank-financed 'Clean Environment Project' in the area of solid waste management, the Asian Development Bank-financed 'Preparing Outer Islands for Sustainable Energy Development Project' in the area of renewable energy (particularly photovoltaic systems), and the EU-financed climate change adaptation initiative to implement the Nationally Determined Contributions commitments.
123. *Other partnerships.* These will include agreements with: (i) MACO, MFLC and SDFC for the provision of inputs, services and financing; (ii) Ministry of Health and Ministry of Gender, Family and Social Services for gender, youth and nutrition activities; (iii) CGIAR institutes, the Coconut Research Institute of Sri Lanka, the Coconut Research Station Kerala, India and Bangladesh Agricultural Research Institute for generation of new technologies, particularly planting material; (iv) Business Development Services Centre, ADB's Inclusive Micro, Small, and Medium-Sized Enterprise Development Project, and its seven business centres across the country, for business services; (v) UNICEF Maldives and the Resilient Island Foundation for work with ultra-poor families on food security, health care and household income generating activities; and (vi) at decentralised level, synergies

will be sought with health and nutrition programmes financed by other partners.

G. Costs, benefits and financing

a. Project costs

124. The key assumptions underlying the derivation of programme costs are: (i) programme costing is based on November 2019 prices; (ii) consumer price inflation is projected at 1%, as calculated by the Economist Intelligence Unit; (iii) the official exchange rate of MVR 15.35 to USD 1 prevailing in November-December 2019 is the base exchange rate applied; (iv) there are no taxes on agricultural goods nor inputs; any future taxes on goods and services procured under MAP will be financed by the Government; and, (v) physical and price contingencies are estimated at 2% of base costs.
125. The total programme cost amounts to USD 12.9 million (MVR 195.8 billion) over a five-year implementation period. All costs and exchange rates are based on currently prevailing prices/rates in the Maldives. Management amounts to 15% of total costs. Programme costs by component, by expenditure category, and by year are presented in Tables 2-4.

126. **Table 2: Programme costs by component (and sub-components) and financier**

127. (Thousands of United States dollars)

	IFAD LOAN		IFAD Grant		MACO		Private Invest		SDFC		Govt Budget		Total	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
A. Enabling Policy, Institutions and Services														
Knowledge and Technology	736	53.6	578	42.1	-	-	-	-	-	-	58	4.2	1,372	10.6
Input Supply	1,558	86.8	-	-	121	6.8	-	-	-	-	117	6.5	1,795	13.9
Subtotal Enabling Policy, Institutions and Services	2,294	72.4	578	18.3	121	3.8	-	-	-	-	174	5.5	3,167	24.6
B. Climate Smart Production	609	9.9	245	4.0	33	0.5	-	-	5,000	81.3	261	4.2	6,148	47.7
C. Market Connection	382	23.3	100	6.1	-	-	1,140	69.7	-	-	15	0.9	1,637	12.7
D. Programme Management	-	-	293	15.1	-	-	-	-	-	-	1,646	84.9	1,938	15.0
Total PROJECT COSTS	3,285	25.5	1,215	9.4	154	1.2	1,140	8.8	5,000	38.8	2,096	16.3	12,890	100.0

128. **Table 3: Programme costs by expenditure category and financier**

129. (Thousands of United States dollars)

	IFAD LOAN		IFAD Grant		MACO		Private Invest		SDFC		Govt Budget		Total	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
I. Investment Costs														
A. Goods, Equipment and Materials														
Goods, Equipment and Materials	1,705	88.8	-	-	-	-	-	-	-	-	215	11.2	1,919	14.9
B. Technical Assistance and Studies														
International TA	67	13.0	452	87.0	-	-	-	-	-	-	-	-	519	4.0
National TA	546	76.6	13	1.8	121	17.0	-	-	-	-	32	4.5	712	5.5
Studies	-	-	210	100.0	-	-	-	-	-	-	-	-	210	1.6
Subtotal Technical Assistance and Studies	613	42.5	675	46.8	121	8.4	-	-	-	-	32	2.2	1,441	11.2
C. Training and Workshops														
Training and workshops	327	75.6	16	3.7	33	7.6	-	-	-	-	57	13.1	432	3.4
D. Innovation Investments /a	640	30.1	345	16.2	-	-	1,140	53.6	-	-	-	-	2,125	16.5
E. SDFC Financing	-	-	-	-	-	-	-	-	5,000	95.0	261	5.0	5,261	40.8
Total Investment Costs	3,285	29.4	1,035	9.3	154	1.4	1,140	10.2	5,000	44.7	565	5.1	11,179	86.7
II. Recurrent Costs														
A. Salaries and Allowances	-	-	180	11.1	-	-	-	-	-	-	1,448	88.9	1,628	12.6
B. Operational Expenses	-	-	-	-	-	-	-	-	-	-	84	100.0	84	0.7
Total Recurrent Costs	-	-	180	10.5	-	-	-	-	-	-	1,531	89.5	1,711	13.3
Total PROJECT COSTS	3,285	25.5	1,215	9.4	154	1.2	1,140	8.8	5,000	38.8	2,096	16.3	12,890	100.0

130. **Table 4: Programme costs by component and year**

131. (Thousands of United States dollars)

	Totals Including Contingencies					
	PY1	PY2	PY3	PY4	PY5	Total
A. Enabling Policy, Institutions and Services						
Knowledge and Technology	756.5	392.0	101.6	76.9	45.3	1,372.1
Input Supply	1,297.8	135.7	139.1	109.9	112.7	1,795.3
Subtotal Enabling Policy, Institutions and Services	2,054.3	527.7	240.7	186.8	157.9	3,167.4
B. Climate Smart Production	16.7	659.3	2,056.4	1,710.0	1,705.6	6,147.9
C. Market Connection	213.0	388.1	601.8	243.8	190.0	1,636.6
D. Programme Management	414.4	359.5	386.8	365.0	412.4	1,938.1
Total PROJECT COSTS	2,698.4	1,934.6	3,285.6	2,505.6	2,465.8	12,890.0

b. Project financing/co-financing strategy and plan

132. IFAD financing is provided as a 73% highly concessional loan and a 27% DSF grant. The programme will be financed by an IFAD loan of USD 3.3 million, an IFAD grant of USD 1.2 million, MACO contribution of USD 0.2 million, private investment (commercial islands, MFLC, beneficiaries) of USD 1.1 million, SDFC cofinancing of USD 5.0 million, and Government contribution in cash of USD 2.1 million. Opportunities to leverage cofinancing from external partners will be sought during implementation.

133. *Climate finance*. The calculated IFAD climate finance for the programme amounts to USD 3,264,000, which represents 73% of the total IFAD financing envelope. This calculated amount represents climate change adaptation finance.

c. Disbursement

134. Withdrawal of funds and use of loan and grant proceeds is governed by IFAD's Loan Disbursement Handbook (LDH) and the Financing Agreement. Applicable procedures for disbursement, financial reporting and maintenance of programme records will be detailed in a Letter to the Borrower/Recipient (LTB/R) upon signature of the Financing Agreement.

135. Three standard disbursement procedures are available for withdrawal of financing: (i) advance withdrawal; (ii) direct payment; and (iii) reimbursement. These are detailed in the LDH and will be outlined in the LTB/R.

136. *Flow of funds*. MAP will open, maintain and operate two Designated Accounts (DAs) denominated in USD in the central bank (Maldives Monetary Authority) to receive the loan and grant proceeds respectively. The DAs will be administered on the basis of imprest arrangements, in which an initial amount of the loan and grant is advanced and then replenished periodically based on justified expenditures. The maximum advances provided by IFAD to the DAs will be established as an authorized allocation in the LTB/R.

137. For all programme expenditure, a payment request will be prepared by the accountant and approved by the finance executive (budget section) and programme director. It will then be submitted to the Ministry of Finance (MoF) based on which funds will be disbursed by the MMA directly to the bank account of the vendor or other payee as required. Expenditure incurred by MACO will follow a similar pattern; the accounts team at MACO will send a payment request to the MoF for which funds will be disbursed by the MMA on approval to the vendor. Except petty cash, no other cash transactions will be permitted by the programme.

138. The counterpart funds from the Government will be recorded in the books of accounts of the PIU. The process for claiming counterpart funds will also be similar to IFAD expenditure, with a payment request being made by the PIU to MOFMRA which in turn will submit it to MoF. On approval by MoF, the MMA will release the funds to the payee as requested. Thus, all funds for the programme implementation will be released by the MMA based on approved payment requests from the PIU, and the PIU will not have any other programme bank account.

139. *Retro-active financing*. Upon Government request, a portion of IFAD financing can be provided as retroactive financing, as an exception to the General Conditions and with Executive Board approval, to cover eligible expenditures between the date of approval of the design document by IFAD and the date of Entry into Force. Activities that can be funded under retroactive financing may be: (i) eligible costs related to MACO set up; (ii) staff recruitment costs and salaries; (iii) purchase of a minimum set of equipment and materials; and (vi) activities related to the baseline survey. To be eligible for retroactive financing, goods and services must have been procured according to IFAD procurement procedures. It is expected that the costs for such activities will not exceed USD 450,000 and will be charged to the respective loan categories. GoM pre-finances retroactive expenditures at its own risk. If the financing is not approved by the Executive Board, or does not enter into force, expenditures will not be reimbursed. The date after which expenditures become eligible for retroactive financing should not be earlier than the programme design date.

140. All financing and programme expenditure shall be exempt from all taxes. Any applicable taxes will be covered by the GoM contribution to the programme. Social security benefits, if any, (employee's portion) and income tax (employee deductions) are eligible for IFAD financing.

d. Summary of benefits and economic analysis

141. *Beneficiaries*. MAP will directly benefit 6,000 small farm households consisting of 31,800 persons. These consist of 2,795

households benefitting from the full range of investments (services, training, financing, market access) and 3,205 households benefiting from a set of investments (services, training, market access). In addition, 2,460 incremental full time job equivalents will be created. MAP will indirectly benefit all other small farm households in the Maldives.

142. *Benefits.* The programme will generate a range of social, nutritional, financial, economic and institutional benefits. Financial and economic benefits would accrue from: (i) increased farm productivity and reduced production costs due to the adoption of climate smart technologies; (ii) reduced post-harvest losses and consequent increased proportion of marketed output; (iii) improved quality and safety of agricultural and food products, attracting higher prices and increased sales and net margins; (iv) increased farm incomes through diversification to high value commodities; (v) increased employment for hired labour; (vi) reduced imports and improved balance of payments; and, (vii) increased revenues for the Government as a result of increased volume of taxable production (GST).
143. Nutritional benefits will derive from the substantially greater production of high value commodities which are nutrition-sensitive, such as vegetables, fruits, nuts (both indigenous and conventional) and root crops. Additional intake of vegetables, fruit/nuts and root crops will reduce micronutrient deficiencies, especially among children and women. Nutritionally beneficial incremental vegetable production will include tomato, eggplants, okra, squash, pumpkin, lettuce, cabbage, chilli, bell pepper, microgreens, cucumber, herbs, leeks, onions, watercress, broccoli, string beans and chives, while incremental fruit production will include papaya, banana, citrus, coconuts and mango. Incremental root crop production will focus on sweet potato, taro and yam. Production of nutrition-sensitive crops will be intensified in areas with substantial micronutrient deficiencies, in consultation with Ministry of Health. Production of nutrition-sensitive crops will be accompanied by awareness-raising of nutrition issues.
144. *Financial analysis.* The main results of the financial analysis include: (i) a significant increase in gross and net returns from each model between the without and with project situation; (ii) positive benefit/cost ratios illustrating the worthiness of the investments; the respective NPVs range from USD 3,812 to USD 76,056, while the IRRs range from 12% to 50%, which are comparable to those of existing similar operations in the region. The analysis shows that the models are more sensitive to changes in productivity and price assumptions than they are to variations in investment and operating costs.
145. *Economic analysis.* The economic analysis hinges on the following assumptions: (i) programme life is assumed for 20 years in light of the investments lifecycle; (ii) inputs and outputs are valued at their economic parity prices; (iii) a 7% financial discount rate is applied, which is the same as MMA's refinancing rate (latest update 29 November 2019), and the same rate is used for the economic discount; (iv) the opportunity cost of rural labour is estimated considering the official unemployment rate (6%); as such the shadow wage rate factor is equal to 0.94, or a daily wage of MVR 611 (USD 39.8); (v) the shadow exchange rate factor is 1.04 and the shadow exchange rate, estimated using international trade data, is equal to MVR 16.02 per USD 1.0; (vi) it is assumed that at least 80% of investments will achieve the estimated returns; and (vii) financing flows are included in the calculations as they are already reflected in the production costs.
146. Based on the above, the programme's economic internal rate of return (EIRR) is 12.9% and the economic net present value is USD 9.1 million. This indicates that the programme is a technically and economically viable investment for the economy as a whole.
147. *Sensitivity analysis.* The sensitivity analysis shows that the programme is economically robust in light of potential risks in terms of increased costs, decreased benefits or time overruns. Cost increases by 10%-20%, benefit decreases of 10%-20%, or time overruns of one or two years yield EIRRs that are higher than the opportunity cost of capital and therefore indicate that the proposed investments are indeed robust.

148. **Table 4: Sensitivity Analysis**

Sensitivity Analysis (20-year period)	Base case	Costs Increase			Increase of Benefits		Decrease of Benefits			Delay of Benefits	
		+ 10%	+ 20%	+ 50%	+ 10%	+ 20%	- 10%	- 20%	- 30%	1 year	2 years
ERR	12.9%	12.4%	11.8%	10.4%	13.5%	14.0%	12.3%	11.6%	10.7%	11.9%	10.8%
ENPV (USD mln)	9.1	8.5	7.8	5.8	10.7	12.2	7.6	6.0	4.4	7.1	5.3

e. Exit Strategy and Sustainability

149. *Sustainability.* The design of MAP integrates substantial elements to assure the financial, institutional, nutritional, technical and environmental sustainability of the programme.

- *Financial sustainability.* The underlying commercial business relationships to be fostered among input supply, extension, financing, production and markets, supplemented by enhanced logistics, provide a solid foundation for financial sustainability. Once profitable business relationships among value chain actors are structured and operational, programme interventions will no longer be required. The market is significant and assured, considering that 95% of food is currently imported, that local demand is rising rapidly as incomes increase, and that the tourism sector imports substantial volumes of agricultural commodities.
- *Sectoral sustainability.* MAP will contribute to developing a structured policy environment and incentive framework for the agriculture sector led by MOFMRA, a strengthened institutional support system through MACO and ARC, and group-based ELF extension through ARC and commercial islands. The entire agriculture sector will thus be upgraded, with nationwide benefits outlasting the programme.
- *Institutional sustainability.* The representation, advocacy and operational functions of Island and Regional Farmer Forums will ensure the sustainability of the strengthened interface of farmers with MOFMRA and with services, financing, logistics and markets. Once these Forums have developed relationships across the value chain, incremental programmatic support will not be required.

- *Nutritional sustainability.* MAP will introduce and modernise nutritionally-sensitive value chains for vegetables, fruits and root crops, all of which provide improved nutrition and reduce micronutrient deficiencies, combined with nutrition awareness raising. Once these value chains are well established at production and market levels, external intervention will no longer be required, also considering that many consumers are demanding food products with better nutritional characteristics.
- *Technical sustainability.* Climate-smart technological solutions suitable for the Maldives, which overcome land/soil/water constraints and mitigate against climate change, are available globally. Once they are tested, adapted to local conditions, and successfully demonstrated, their sustainability is not perceived to be a risk.
- *Environmental sustainability.* MAP investments are designed to be environmentally sustainable and climate-resilient across the board. Indeed, in many cases, the soil/water/chemicals-efficient production technologies to be introduced will replace current activities that are ecologically unsustainable and damaging.

150. *Exit strategy.* The programme's exit strategy is to systematically ensure the financial, sectoral, institutional, nutritional, technical and environmental sustainability of its activities, to the point where programme interventions are no longer required.

3. Risks

H. Project risks and mitigation measures

1. The main assessed risk categories and sub-categories, the inherent and residual risk levels, and the mitigation measures under the programme are outlined below.

151.

MAP – Integrated Programme Risk Framework (IPRM)

#	Risk category/sub-category/ description	Inherent risk	Residual risk	MAP Mitigation
1.	Country context			
1.1	<i>Governance.</i> Weak agriculture sector governance and institutions may undermine implementation.	Moderate	Low	1. institutional strengthening 2. Island Farmer Forums 3. FM/procurement compliance 4. internal/external audit
2.	Sector strategy/policy			
2.1	<i>Policy development and implementation.</i> Government policy for agri. sector is evolving. Weak implementation of Agriculture Development Master Plan.	Moderate	Low	1. policy strengthening 2. sector incentive framework 3. investment across sector 4. modernisation/commercialisation 5. Master Plan alignment 6. RBA partnerships
3.	Environment/climate			

#	Risk category/sub-category/ description	Inherent risk	Residual risk	MAP Mitigation
3.1	<p><i>Environment vulnerability.</i></p> <p>Groundwater over-extraction, misuse of fertiliser and pesticides, coastal erosion are risks.</p>	Substantial	Low	<ul style="list-style-type: none"> 1. rainwater harvesting 2. water treatment protocols 3. balanced fertiliser use 4. IPM/biological control 5. resilient planting materials 6. intercropping with legumes 7. improved soil productivity 8. improved soil water retention
3.2	<p><i>Climate vulnerability.</i></p> <p>Maldives is vulnerable to unpredictable rainfall, global warming, sea level rise, extreme weather events.</p>	High	High	<ul style="list-style-type: none"> 1. drought tolerant cropping 2. vertical hydroponic systems 3. enclosed greenhouses 4. water harvesting 5. drip irrigation/efficiency 6. island-level integrative approach 7. flood-proofing of infrastructure 8. solar energy systems 9. CC institutional awareness
4	Institutional capacity for implementation/sustainability			
4.1	<p><i>Implementation arrangements.</i></p> <p>MOFMRA has weak programme implementation capacity.</p>	Substantial	Low	<ul style="list-style-type: none"> 1. PIU with strong appointed staff 2. UNOPS providing robust TA 3. intensive IFAD oversight/support
6	Project procurement			

#	Risk category/sub-category/ description	Inherent risk	Residual risk	MAP Mitigation
6.1	<p><i>Capability in public procurement</i></p> <p>MOFMRA and PIU have limited procurement capacity. Standard bidding documents not available for all procurement methods. Bid submission timelines differ from those required by IFAD.</p>	Moderate	Low	<ul style="list-style-type: none"> 1. Deploy full-time procurement specialist in the beginning of programme 2. Impart procurement training staff strong TA support from UNOPS 3. use IFAD /approved standard bid documents 4. use IFAD bid submission timelines 5. intensive IFAD procurement and contract monitoring / Support
7	Environment, social and climate impact			
7.1	<p><i>Resource efficiency and pollution prevention.</i></p> <p>The programme may damage fragile groundwater aquifers.</p>	Moderate	Low	<ul style="list-style-type: none"> 1. rainwater harvesting 2. water treatment protocols 3. balanced fertiliser use 4. IPM and biological control 5. discourage groundwater extraction
7.2	<p><i>Vulnerability of target populations and ecosystems to climate variability and hazards.</i></p> <p>The programme may increase the exposure of farming to climate variability and hazards due to the increasing impacts of climate change.</p>	High	Low	<ul style="list-style-type: none"> 1. drought tolerant cropping 2. vertical hydroponic systems 3. enclosed greenhouses 4. water harvesting 5. drip irrigation/efficiency 6. island-level integrative approach 7. flood-proofing of infrastructure 8. solar energy systems 9. CC institutional awareness
8	Stakeholders			

#	Risk category/sub-category/ description	Inherent risk	Residual risk	MAP Mitigation
8.1	<p><i>Stakeholder engagement.</i></p> <p>Insufficient consultation with stakeholders may undermine implementation and achievement of objectives.</p>	Moderate	Low	<ul style="list-style-type: none"> 1. inclusive targeting 2. intensive stakeholder involvement 3. consultation in planning/execution 4. Island Farmer Forums 5. participatory nature of ELFs 6. intensive IFAD oversight/support 7. annual institutional assessments 8. outsourced evaluations
9	Force majeure			
9.1	<p><i>Coronavirus.</i></p> <p>The global spread of coronavirus will substantially reduce tourism income, with adverse effects on the Government budget. The fiscal deficit will expand sharply in the short term.</p>	High	High	This risk is exogenous and cannot be mitigated. However, MAP will increase national food production and help to reduce the current account deficit.
#	Risk category/sub-category/ description	Inherent risk	Residual risk	MAP Mitigation
5	Financial management			
5.1	<p><i>Organisation and staffing.</i></p> <p>Risk of inadequate FM staff in MOFMRRA. Familiarity with IFAD processes and reporting formats.</p>	Moderate	Moderate	<ul style="list-style-type: none"> 1. adequate finance staff, clear JDs 2. training, software, PIM
5.2	<p><i>Internal controls.</i></p> <p>Risk of inadequacy of internal controls for the type of activities to be carried out</p>	Moderate	Moderate	<ul style="list-style-type: none"> 1. segregation of fiduciary duties 2. periodic reconciliations 3. restricted access to documents 4. periodic count of inventory/assets

#	Risk category/sub-category/ description	Inherent risk	Residual risk	MAP Mitigation
5.3	<p><i>Accounting & financial reporting.</i></p> <p>Risk that accounting systems are not integrated/reliable, leading to inaccuracies in financial records. Risk that lack of appropriate financial information reduces utility for monitoring.</p>	High	Substantial	1. use of accounting software 2. back-up of accounting records 3. use of registry of fixed assets 4. PIM to detail requirements 5. use of proper reporting templates
5.4	<p><i>External audit.</i></p> <p>Risk that independent audit is not in place or performed timely, with possible misrepresentation of financial results or suspension or other remedies due to compliance breaches.</p>	Moderate	Moderate	1. Audit by Office of Auditor General 2. compliance with IFAD guidelines 3. implement audit observations 4. technical assistance in FM

I. Environment and Social category

152. The programme is classified as environmental and social **Category B**. In environmental terms, its activities will not trigger any Category A criteria and are consistent with the following criteria and categories characteristic of Category B projects: (i) the development of agro-processing facilities; (ii) agricultural intensification and/or expansion of cropping area in non-sensitive areas; and (iv) credit operations through financial service providers. These will likely have adverse environmental impacts on habitats, ecosystems and/or livelihoods that are site-specific, and are mitigated by known measures included in MAP design and ESMP.
153. These mitigation measures include: (i) rainwater harvesting measures (tide ridges for field and tree crops; lined ponds and greenhouse roof collection mechanisms for hydroponic and drip fertigation systems) rather than the current practice of groundwater extraction in the dry season which is leading to overexploitation; (ii) clear protocols for disposal of irrigation water from hydroponic systems in an environmentally safe manner; (iii) environmentally sustainable production practices (balanced fertilizer use, green manure and mulching, composting, integrated pest management, drip fertigation, closed vertical hydroponics and grafting, photovoltaic systems for energy); (iv) biological control agents and IPM minimising use of pesticides which will be managed through the introduction of MGAP; this will reduce leaching of chemicals into the water lens; (v) dwarf coconuts for replanting of old senile coconut plantations, which are higher yielding, withstand storms better than tall varieties, and facilitate control of the rhino beetle; (vi) inter-cropping of legumes in coconut plantations, which will reduce coastal erosion and improve soil productivity and water retention capacity. Furthermore, during implementation, island-specific diagnostic profiles will be prepared to identify synergies with relevant national programmes in terms of solid waste, integrative water management efforts and climate change adaptation interventions.
154. Similarly, in social terms, the programme meets the following social criteria typical of a category B project: (i) agricultural intensification and/or expansion of cropping area in non-sensitive areas that may have adverse impacts on habitats, ecosystems and/or livelihoods; (ii) short-term public health and safety concerns; and, (iii) requiring a migrant workforce or seasonal workers (for construction, planting, harvesting). These social risks are deemed to be minimal, with MAP activities aimed at comprehensive social inclusion (women, youth, migrants), nutrition awareness and compliance with MGAP standards, in line with the ESMP.

J. Climate Risk classification

155. The Maldives' fragile ecological profile and low elevation combined with its economic dependence on limited sectors makes it among the world's most vulnerable nations subject to the effects of climate change. Over 80% of the total land area is less than 1m above MSL. As sea level is projected to rise within the range of 9cm to 88cm between 1990 and 2100, many islands would be submerged in the projected worst case scenario. The coral islands that make up the Maldives are morphologically unstable and change in their size, shape, elevation and position on reef platforms over time. The small size of the islands forces people, infrastructure and livelihood systems to be in close proximity to the sea which, in combination with the low elevation of islands, contribute to severe risk of inundation with higher sea levels. The main climate change-related impacts in Maldives are associated with: (i) more unpredictable rainfall patterns, (ii) steadily increasing surface temperature, (iii) continued sea level rise, (iv) frequent exposure to natural disasters and extreme events.
156. The climate risk category for MAP is rated as **High**, as it meets 4 of the 7 initial criteria of climate risk screening. These are: (i) the programme area is subject to extreme climatic events (1), (ii) the programme would make investments in low-lying areas exposed to tropical storms (3), (iii) the programme would be located in areas where rural development activities have experienced significant weather-related losses in the past (6); and (iv) the programme would support infrastructure in areas characterized by extreme weather events (7).
157. As such, a detailed Climate Risk Analysis has been carried out, and relevant climate adaptation measures incorporated in MAP design. These include: (i) shifting to thermophilic and drought tolerant crops; (ii) water harvesting combined with increased

irrigation efficiencies (hydroponic schemes, drip irrigation); (iii) shifting to covered infrastructure (greenhouses and net covered growing platforms that support hydroponic and fertigation schemes); (iv) promotion of an island-specific integrative approach to define collaborative approaches with relevant national programmes in particular with respect to solid waste, integrative water management, and climate adaptation interventions; (v) flood-proofing in the design of MAP-supported infrastructure; (vi) mainstreaming climate change, sea level rise and natural hazard issues into all institutional capacity building work.

158. The programme is unlikely to result in any significant impacts to existing land use (deforestation/reforestation), grassland/livestock systems, forest and peat soil management, existing wetland systems and/or fisheries. There however may be some increase in carbon emissions associated with possible changes to perennial cropland systems and increased use of chemical inputs. This will be offset by promotion of more efficient farming practices, reduced application of nitrogen-based fertilizers, a shift to highly productive agriculture (e.g. hydroponics) and promotion of increased use of solar energy systems.

4. Implementation

K. Organizational Framework

a. Project management and coordination

159. The overall responsibility for MAP management and implementation will be assumed by the MOFMRA, which is the Lead Programme Agency. MoF will be responsible for ensuring the timely flow of funds to MOFMRA for implementation. The Ministry of Economic Development (MED) will be responsible for guiding the setting up of MACO that will serve as implementing agency of the programme. The Ministry of National Planning and Infrastructure (MONPI) will partner with MOFMRA to set up cold storage facilities and other relevant infrastructure.
160. *Project Steering Committee (PSC).* The PSC will provide oversight and strategic guidance to the programme. It will be chaired by the Minister, MOFMRA, and consist of representatives from MOFMRA, MOF, MED, MONPI, MOE, and other relevant agencies. Representatives from other stakeholder groups, such as MACO, the private sector, and farmer organisations, will be invited to join the PSC as required. The PSC will meet at least bi-annually, and on ad hoc basis when necessary. It will: (i) ensure that programme activities comply with Government and IFAD policies; (ii) approve AWPBs and procurement plans; (iii) oversee programme progress and performance; (iv) ensure and monitor efficiency and inter-agency coordination; (v) ensure adherence to financial management and procurement procedures; (vi) facilitate implementation; (vii) ensure mainstreaming of climate change, gender and nutrition themes; (viii) recommend changes where necessary, in consultation with IFAD; and (ix) provide policy direction. Ad hoc technical committees can be formed under the PSC if required to create synergy with other stakeholders and partners.
161. *Programme Implementation Unit (PIU).* The importance of establishing robust project management capacity has been demonstrated by the experiences of IFAD and partners in the Maldives. The PIU will be established with strong management skills and technical resources. The PIU will play a crucial role in the overall project management and coordination mechanism of MAP. It will be responsible for the daily management of project activities, coordination among the implementing agencies, and provide and technical and policy advice for project implementation. It will be established in the Planning and Programme Coordination Section of MOFMRA, and physically located within or in proximity of MOFMRA. As the Secretariat for the PSC, the PIU will organize the bi-annual and other PSC meetings as needed. A qualified Programme Director (PD) reporting to the MOFMRA Permanent Secretary will be appointed to lead the PIU. Under the direction of the PD, the PIU will include a management team of Government-seconded officers and support staff, and supported by a programme management agency, which will form a technical team in support of the PIU. The qualifications and experience requirements, and the appointment criteria, for selection of programme management and staff will be defined in the PIM.
162. The PIU will be responsible for: (i) ensuring that the programme strategy is properly applied throughout implementation; (ii) coordinating the programming of planned activities; (iii) preparing AWPBs and procurement plans; (iv) coordinating the timely implementation of approved AWPBs by each implementing partner or line agency; (v) ensuring timely M&E, progress reporting, and knowledge management; (vi) administering all aspects of financial management and procurement; (vii) serving as PSC Secretariat; and, (viii) developing synergies and partnerships with relevant development programmes.
163. *PIU staffing.* The PIU will be composed of: Programme Director; three Component Coordinators (Policy/Institutions Specialist, Agriculture Specialist, Agribusiness Specialist), Planning/Administrative Officer, Financial Management Officer, Accountant, Assistant Accountant, M&E/KM Officer, Procurement Officer, Targeting/Gender Officer, and at least five support staff. These Government-seconded staff should have relevant qualifications and experience as a condition of their appointment. PIU staff salaries and associated benefit packages and allowances will be financed by the Government as part of its contribution; a performance incentive package will be financed by the IFAD grant to stimulate performance-based management efficiency.
164. *Technical assistance.* A qualified programme management agency will be contracted to provide managerial and technical support for the implementation of the programme. UNOPS has been pre-selected for this purpose, subject to conclusion of a suitable agreement between MOFMRA and UNOPS. UNOPS will provide a qualified and experienced Chief Technical Advisor on long-term basis, and short-term technical specialists as required. The duration of this support will be two years, and will have the broader objective of strengthening programme management and capacities within MOFMRA.
165. Specifically, the UNOPS team will provide specialised managerial and technical guidance to the PIU, and support MOFMRA and the PIU to develop programme management systems and capacities as part of its institutional capacity building agenda. It will build a strong team of management professionals in the PIU to ensure high quality outputs and achievement of goals and targets.

It will support MAP implementation progress and performance towards the achievement of expected targets at output, outcome and objective levels. UNOPS will define and implement a clear roadmap of managerial and technical skill-building for MOFMRA and relevant agencies.

166. *Implementation partnerships.* Implementation agencies and partners such as MACO, SDFC, MFLC and possibly MGFSS will enter into agreements or MoUs with MOFMRA which stipulate the respective roles and responsibilities of the parties. Similarly, agreements will be signed between MOFMRA and commercial islands governing roles and responsibilities.

b. Financial Management, Procurement and Governance

167. *Accounting and reporting.* All programme accounting and financial reporting will be in line with IFAD guidelines as published on IFAD's website and reflected in the LTB/R. MOFMRA follows the accounting system prescribed by MoF which uses a SAP system for bookkeeping; MAP will also use SAP to ensure integration with MoF's records. The accounting and financial reporting of the programme will apply the International Public Sector Accounting Standards (IPSAS) on cash basis. The PIU will be responsible to consolidate financial information received from implementing partners and to prepare annual financial statements of the programme. Annual financial statements shall be prepared in accordance with the requirements of IPSAS-Cash and provided to IFAD within three months of the end of each fiscal year.
168. *Internal controls.* There is an effective internal control system in place within MOFMRA. However, the internal control arrangements at the PIU will need to be strengthened to include: (i) operations are conducted effectively and efficiently; (ii) financial and operational reporting is reliable; (iii) applicable laws and regulations are complied with; and (iv) assets and records are safeguarded. MOFMRA's internal control procedures will be applied, unless otherwise specified in the PIM. MAP's internal control arrangements will ensure operational efficiency, reliability of reporting and compliance with requirements. They will consider: (i) appointment of competent personnel with clear responsibilities and adequate segregation of duties; (ii) establishment of an adequate financial record management system which has a complete audit trail; (iii) set up of physical safeguards; and, (iv) independent check, with procedures subject to random independent reviews.
169. *Internal audit.* Currently there is no system of internal audit within MOFMRA. For MAP, the PIU will appoint an independent firm of Chartered Accountants to undertake internal audit functions from the first year of operation. Besides the financial audit, the internal auditors will review the systems of internal control and suggest improvements if required. The internal audit should also include statutory FM and procurement compliances. Internal audit reports will be submitted to the PSC on six-monthly basis.
170. *External audit.* MAP accounts will be audited annually by the Auditor General of the Republic of the Maldives, which is the supreme audit institution. The external audit will be carried out in accordance with International Standards on Auditing (ISA) and in compliance with IFAD's Handbook for Financial Reporting and Auditing published on IFAD's website. The audited project financial statements together with the auditor's opinion will be submitted to IFAD in English within 6 months of the end of each fiscal year.
171. *Procurement.* Procurement under MAP will be undertaken by the PIU in accordance with the National Procurement Regulations (Chapter 10 of the Public Financial Regulations) to the extent that they do not contradict IFAD's Procurement Guidelines and Procurement Handbook; where there are contradictions, IFAD's Guidelines and Handbook will prevail. Specific procurement arrangements, procedures and thresholds will be elaborated in detail in the PIM and the LTB/R.
172. To ensure that procurement is carried out as per the National Procurement Regulations and the IFAD Procurement Guidelines and Handbook, the PIU will have a full time Procurement Officer whose responsibilities are defined in line with the National Procurement Regulations. They will include preparation of procurement plans; procurement of goods, works and services; maintenance of procurement documentation; and contract monitoring.
173. The thresholds defined in the National Procurement Regulation will be followed for the definition of applicable procurement methods. The following minimum time limits for bid submission will apply: four weeks for open tenders and requests for proposals; two weeks for restricted tenders and expressions of interest; and one week for quotations.
174. Tender documents will be prepared using the standard bidding documents issued by MoF. Where standard documents are not available, the PIU will prepare customized documents in line with Module H of the IFAD Procurement Handbook. The first set of tender documents prepared by the PIU for each type of procurement will be submitted for IFAD clearance.
175. Procurement activities with an estimated cost of USD 50,000 or more for goods and works, and USD 30,000 or more for services, will be subject to prior review by IFAD. Procurement activities below these thresholds shall be subject to post review by IFAD. For all programme procurement, records will be filed by the PIU in accordance with Module C of the IFAD Procurement Handbook.
176. *Governance.* Programme implementation will comply with the provisions of IFAD's Policy on Preventing Fraud and Corruption, published on IFAD's website. Good governance under MAP aims to ensure transparency, accountability in use of resources, and participation of stakeholders in planning and delivery of investments and services. Key aspects of good governance identified for MAP include the following: (i) inclusive targeting of small farmers, women and the youth; (ii) participation of stakeholders in planning and execution; (iii) transparent establishment of Island Farmer Forums, consultative election of their leaders, and participatory appointment of ELF; (iv) compliant FM, accounting, procurement and recruitment systems, and rigorous internal and external audit; (v) intensive IFAD supervision and compliance control, including spot checks by regular supervision missions, review of FM and procurement, and technical audits if needed; (vi) regular outcome surveys that provide information on how well programme outputs are being delivered, in terms of coverage and quality; and, (vii) reporting of results to Government and stakeholders, with key information and reports published as part of the knowledge management agenda.
177. The programme's transparency framework will include the following measures: (i) wide publication of tenders; (ii) FM and

procurement compliance; (iii) code of conduct signed by all PIU staff; (iv) code of business ethics to be included in all contracts, agreements and MoUs; (v) annual assessments of the performance of implementing agencies, commercial islands, Island Farmer Forums and ELFs; (vi) IFAD supervision to assess compliance; (vii) participation of stakeholders in planning, execution and M&E; and (viii) impact assessments and evaluation outsourced to independent institutions.

L. Planning, M&E, Learning, KM and Communication

a. Planning, M&E, Learning, Knowledge Management and Communication

178. *Planning.* MAP will apply a results-based management approach, which establishes a solid linkage between planning (including resource allocation), implementation, monitoring and expected results. The annual work plan and budget (AWPB) will constitute the annual basis for implementation and should clearly describe the strategic direction of the programme, the expected results under each component, and associated risk mitigation measures. The PIU will be responsible for preparing AWPBs, in consultation with all stakeholders (MACO, ARC, Island Farmer Forums, commercial islands, wholesale markets, etc). A participatory annual planning process will be set up with Island Farmer Forums to ensure bottom-up feedback on community needs, priorities, contextual opportunities and limitations. The PIU will seek PSC and IFAD approval for each AWPB in advance of the national annual budgeting process in order to ensure sufficient counterpart funding. IFAD supervision missions will offer opportunities to review implementation progress against annual targets.
179. *Integrated M&E and KM system.* An integrated Monitoring and Evaluation (M&E) and Knowledge Management (KM) system will be developed in accordance with IFAD guidelines and Government frameworks. It will be utilized as a management tool and knowledge platform, and will include assessment of progress and compliance, identification of constraints and proposed remedial actions. The system will have three main objectives: (i) to monitor physical and financial progress on outputs, outcomes and results, in line with the logframe, disaggregated by gender, age group, island, and socio-economic classification; (ii) to guide implementation and policy dialogue on agricultural commercialisation in the country, based on the analysis of emerging data and information; and (iii) to capture lessons, risks, innovations and technology options for guiding knowledge sharing and scaling up of good practices. Participatory M&E including qualitative surveys will be undertaken on a regular basis. A baseline survey will be undertaken at start up, and outcome surveys, along the lines of the new IFAD Core Outcome Indicator Survey, will be carried out annually. A simplified pro-WEAI survey will be undertaken at baseline and completion to assess improvement in women's agency. An indicative budget of USD 50,000 (within M&E allocation) could be foreseen for this survey. However, the real cost will be based on the outcome of procurement process. The key production and financial indicators will be monitored annually to assess the emerging results of the programme. Progress reports will be published semi-annually and annually, supplemented by periodical thematic studies as required.
180. A practical M&E manual detailing clear objectives, scope, reporting structure, staffing, roles and responsibilities, budget and activities will be prepared by the PIU at programme start-up. Annual M&E plans will be established, including a semi-annual logframe reporting schedule. The system will inform the IFAD Operational Results Measurement System (ORMS) which offers an online platform linking targets (defined in the logframe) through progress toward results (as documented in supervision reports) to final results actually achieved (as reported in PCR). This will serve as an instrument allowing IFAD to publicly report on MAP's contribution to broader country results and the SDGs.
181. As part of the commitment to being gender transformative, a Women's Empowerment in Agriculture Index (WEAI) survey will be undertaken at baseline and completion. It will assess the increase in participating women's agency and empowerment. Aspects of this Index will be included in the outcome surveys, particularly with regard to asset management and productivity. Similarly, in its commitment to mainstreaming nutrition, surveys to assess the minimum dietary diversity for women will be conducted at baseline and completion.
182. *Learning, knowledge management and learning.* Output, outcome and impact data generated by the M&E system will inform case studies, briefs and reports. These will be used for policy dialogue, peer-learning, and potential scaling-up..
183. *Learning, knowledge management and communication.* MAP represents a good platform for learning about the inter-relationships of the enabling environment, enhanced climate-smart production, and agricultural commercialisation in the Maldives. MAP's KM activities will support the effective flow of relevant learning and information among relevant agencies, programme staff, beneficiaries and other stakeholders. A comprehensive KM action plan will be developed in the early stages of implementation in line with IFAD and Government policies on KM to ensure that knowledge, technologies and innovations generated are systematically identified, analysed, documented, shared and eventually scaled up. KM products will be communicated through multiple sources including blogs, written publications, video and social media.
184. *Website.* The programme will establish and maintain a website to share reports, impact studies, case studies, training materials, videos and ICT technologies. It will discourage printing of reports and other documents.

b. Innovation and scaling up

185. MAP will introduce a series of technologies which are innovative in the Maldivian context: (i) self-ventilated greenhouses for the hot humid tropics; (ii) hydroponic irrigation, increasing production area while minimising water use; (iii) closed vertical hydroponic production systems minimising water use and land requirements; (iv) rainwater harvesting and storage reducing pressure on groundwater; (v) commercially sustainable ELF extension system in conjunction with input supply; (vi) marketing arrangements with unbroken transport cold chain; (vii) propagation of the most climate resilient coconut varieties; (viii) holistic coconut based agroforestry cropping systems including fruits, nuts for processing and legumes for compost making; (ix) introduction of MGAP and Codex Alimentarius on a large scale. Scaling up of successful innovations will be driven by the underlying business drivers. MOFMRA is ready to scale up emerging MAP innovations in the northern regions across the country.

M. Implementation plans

a. Supervision, Mid-term Review and Completion plans.

186. MOFMRA is gearing up to undertake key preparatory actions aimed at implementation readiness for MAP. Prior to programme start-up it will confirm the establishment of both the PSC and PIU through official decree. It is organising office space and preparing to appoint programme staff in advance of effectiveness, based on the terms of reference provided in the PIM. Financial management systems, particularly the deployment of SAP, will be completed prior to start-up. Upon PIU establishment and staff appointment, the PIU will refine and finalise the first-year AWPB, the procurement plan, the PIM and the Financial Management Manual, for final review by the PSC and IFAD.
187. As mentioned in Section G, MOFMRA has the option to proceed with retroactive financing for important start up actions and eligible expenditures related to MACO set up, PIU staff appointment and salaries, purchase of equipment and materials, and the baseline survey.
188. A start up workshop will be conducted upon entry into force of the Financing Agreement. The workshop will take stock of preparatory activities undertaken, introduce the programme to all stakeholders, deliberate on and refine implementation procedures, and discuss financial management, procurement, M&E and KM systems and procedures. It will also prepare a system for integrating gender awareness training systematically for the PIU, MOFRMA and implementing agencies.
189. *Supervision.* IFAD will administer the loan and grant, and supervise the programme. Supervision will be annual and will focus on the overall progress and performance of the programme, looking into physical and financial progress, outputs and outcomes, outreach and targeting, gender and youth empowerment, implementation performance and efficiency, risks and opportunities, innovations and KM, sustainability, and FM and procurement compliance.
190. *Mid-term review.* A MTR will be conducted by IFAD and the Government at the mid-point of the implementation period. It will review the overall likelihood of achieving the goals and development objectives, in addition to supervision-type functions. It will provide opportunity for IFAD and Government to make substantial changes to the programme, if required.
191. *Implementation support.* IS missions will be undertaken by IFAD as follow-ups of the supervision process, and as response to any support required by the PIU or MOFMRA. They will be conducted on a demand-driven basis and in line with needs identified.
192. *Programme completion review.* At the end of the implementation cycle, a PCR will be undertaken by the PIU as a self-assessment of the programme's performance. On this basis, IFAD will conduct a PCR mission in close coordination with the Government to report on the results achieved. The main purposes will be to promote accountability, reflect on performance and elicit lessons learned to inform Government initiatives and new programme design, to identify opportunities for scaling-up, and to define an appropriate post-programme strategy. The learning dimension of the completion process will be regarded by both IFAD and the Government as a foundation for improvements in policy-making and programming.

Maldives

Maldives Agribusiness Programme

Project Design Report

Annex 1: Logframe

Mission Dates: 12 - 29 November 2019

Document Date: 22/06/2020

Project No. 2000002416

Report No. 0000

Asia and the Pacific Division
Programme Management Department

Maldives Agribusiness Programme

Logical Framework

Results Hierarchy	Indicators				Means of Verification			Assumptions				
	Name	Baseline	Mid-Term	End Target	Source	Frequency	Responsibility					
Outreach	1.b Estimated corresponding total number of households members				implementing partners' records and PIU records	Semi-annual and annual reports	PIU	The programme achieves its geographic and HH outreach targets and small farmers participate in programme activities				
	Household members			31800								
	1.a Corresponding number of households reached											
	Women-headed households		400	3180								
	Non-women-headed households		1600	2820								
	Households		2000	6000								
	1 Persons receiving services promoted or supported by the project											
	Females		1060	3180								
	Males		940	2820								
	Young		400	1200								
Project Goal Sustainably increased incomes, food security and nutrition status of small farmer households	Male		47	47								
	Female		53	53								
	Young		20	20								
	70% of project supported HHs reporting a 20% increase in their income				70% of project supported HHs reporting a 20% increase in their income	at baseline, mid-term and completion	PIU	Small farmer HHs undergo the process of behavior change in agriculture and livelihoods				

Results Hierarchy	Indicators				Source	Means of Verification	Frequency	Responsibility	Assumptions							
	Name	Baseline	Mid-Term	End Target												
Development Objective Strengthened enabling environment for sustainable and climate-resilient agriculture					surveys of households, qualitative assessment of participating HH	at baseline, mid-term and completion	PIU		Gov. consistent policies, strategies and interventions for sustainable and climate-resilient agriculture							
	Households		30	80												
	% of HH reporting improved food security															
	Households		400	4200												
1.2.8 Women reporting minimum dietary diversity (MDDW)	No. of small farmers reporting access to improved agricultural support services				Survey of households, qualitative assessment of participating HH, technical studies	at baseline, mid-term and completion	PIU									
	Males		940	2820												
	Females		1060	3180												
	Young		120	960												
	1.2.8 Women reporting minimum dietary diversity (MDDW)				Outcome survey	Baseline and Completion	PIU									
	Women (%)	0	18	60												
	% of targeted women reporting increase score on WEAI survey															
	Females	0	18	60												

Results Hierarchy	Indicators				Source	Means of Verification	Frequency	Responsibility	Assumptions
	Name	Baseline	Mid-Term	End Target					
Outcome Outcome 1: Institutional capacity is strengthened by upgrading ARC in Hanimadhu and training MACO staff, enabling quality services to be developed and disseminated for adoption by small farmers	# of new and improved services in the agricultural institutional support system				Sector studies, evaluations, programme M&E system, progress report, periodic surveys	At baseline, mid-term and completion. Annual records and reports	MOFMRA, MACO, all implementing parties	Effective interventions in conducive policy framework, institutions, technical support systems, strengthened introduction and adoption of new and better technologies, knowledge and inputs	
	No. of services		4	10					
Output Output 1.1.1: Policy knowledge products on sustainable and climate-resilient agriculture	Number of policy-relevant knowledge products completed (research, study, strategy, bylaw)				Programme M&E system, periodic reports	Programme M&E system, periodic reports	PIU and participating agencies		
	No of Policy products		1	3					
Output Output 1.1.2 Upgraded capacity of generating knowledge and technologies	Types of facilities and equipment for generating knowledge and technologies (ARC in North)				Programme M&E system, periodic reports	Semi-annual and annual reports	PIU, ARC and participating agencies		
	No. of facilities and equipment		5	9					
Output 1.1.3 Packages of recommendations developed for enhancing financial returns for small farmers	No of new production techniques beneficial to smallholder producers developed and tested				Programme M&E system, periodic reports	Semi-annual and annual reports	PIU, ARC and participating agencies		
	Production techniques		35	75					
Output Output 1.2.1 New technologies, quality inputs transferred to small farmers	No. of extension linkage farmers trained in production practices and/or technologies				Programme M&E system, periodic reports	Semi-annual and annual reports	PIU, ARC and participating agencies		
	Extension linkage farmers trained		8	26					

Results Hierarchy	Indicators				Source	Means of Verification	Frequency	Responsibility	Assumptions
	Name	Baseline	Mid-Term	End Target					
	No. of farmers receiving high quality inputs and technologies				Programme M&E system, periodic reports	Semi-annual and annual reports	PIU, MACO, participating agencies		
	Males		940	2820					
	Females		1060	3180					
	Young								
Output Output 1.2.2 AICT service Established	Service platform on agricultural information and communication technology established				Programme M&E system, periodic reports	Semi-annual and annual reports	PIU, MACO, participating agencies		
	Platform			1					
Outcome Outcome 2 Better/new technologies, inputs adopted and productivity improved	1.2.2 Households reporting adoption of new/improved inputs, technologies or practices				Sector studies, evaluations, programme M&E system, progress report, periodic surveys	Annual	PIU	Effective training of small farmers on enhanced and organized production, production forums formed and working with adopted technologies and GAPs, and increased access to agriculture financing	
	Households		20	70					
	Total number of household members								
	Males								
	Females								
	Young								
	Not Young								
	Indigenous people								
	Non-Indigenous people								
	Women-headed households								

Results Hierarchy	Indicators				Source	Means of Verification	Frequency	Responsibility	Assumptions					
	Name	Baseline	Mid-Term	End Target										
	Non-women-headed households													
	Households													
Output Output 2.1 Beneficiaries trained and adopting improved production practices and/or technologies	No. of farmers trained on production practices and/or technologies including MGAP/ HACCP				Programme M&E system, periodic reports	Semi-annual and annual reports	PIU							
	Males		940	2820										
	Females		1060	3180										
	Young		400	1200										
	1.1.8 Households provided with targeted support to improve their nutrition													
	Total persons participating													
	Households		1060	3180										
	Females		940	3180										
	3.1.2 Persons provided with climate information services													
	Females		1060	3180										

Results Hierarchy	Indicators				Means of Verification	Frequency	Responsibility	Assumptions				
	Name	Baseline	Mid-Term	End Target								
	Persons provided with climate information services											
Output Output 2.2 Island Farmer Forums organized	No. of Island Farmer Forums organized and supported				Programme M&E system, periodic reports	Semi-annual and annual reports	PIU					
	Forums established and supported		50	75								
	No. of farmers participating in Island Farmer Forums											
	Females		980	1470								
	Males		420	630								
	Young		280	420								
	Women in cluster leadership position		10	15								
	3.1.1 Groups supported to sustainably manage natural resources and climate-related risks											
	Groups supported		50	75								
	Total size of groups											
	Males											
	Females											
	Young											

Results Hierarchy	Indicators				Source	Means of Verification	Frequency	Responsibility	Assumptions					
	Name	Baseline	Mid-Term	End Target										
Output Output 2.3 : Increased access to agriculture financing for small farmers	Not Young				Programme M&E system, periodic reports	Semi-annual and annual reports	PIU							
	Indigenous people													
	Non-Indigenous people													
	Women in leadership position													
Outcome Outcome 3 Production decisions respond to market opportunities	No. of farmers accessing agriculture financing				Evaluation studies	Semi-annual and annual reports	PIU		PPP operational and supply contracts or contract farming established with effective marketing support					
	Females		245	1176										
	Males		105	504										
	Young		70	336										
Output Output 3.1 Supply contracts established between producers and private companies incl. commercial islands	No. of supported agribusiness enterprises reporting increase in profit				Programme M&E system, periodic reports	Semi-annual and annual reports	PIU							
	Agribusiness enterprises		5	15										
	No. of supply contracts increased													
	Supply contracts		5	15										
	No. of farmers engaged in supply contract or contract farming				Programme M&E system, periodic reports	Semi-annual and annual reports	PIU							
	Males		490	735										
	Females		210	315										
	Young		140	210										

Results Hierarchy	Indicators				Means of Verification	Frequency	Responsibility	Assumptions
	Name	Baseline	Mid-Term	End Target				
Output Output 3.2 Improved storage and transport facilities for marketing of agri produce	No. cold storage facilities on cargo vessels or on project hubs established/promoted	Cold Storage facilities			Programme M&E system, periodic report	Semi-annual and annual reports	PIU	

Maldives

Maldives Agribusiness Programme

Project Design Report

Annex 2: Theory of change

Mission Dates: 12 - 29 November 2019

Document Date: 22/06/2020

Project No. 2000002416

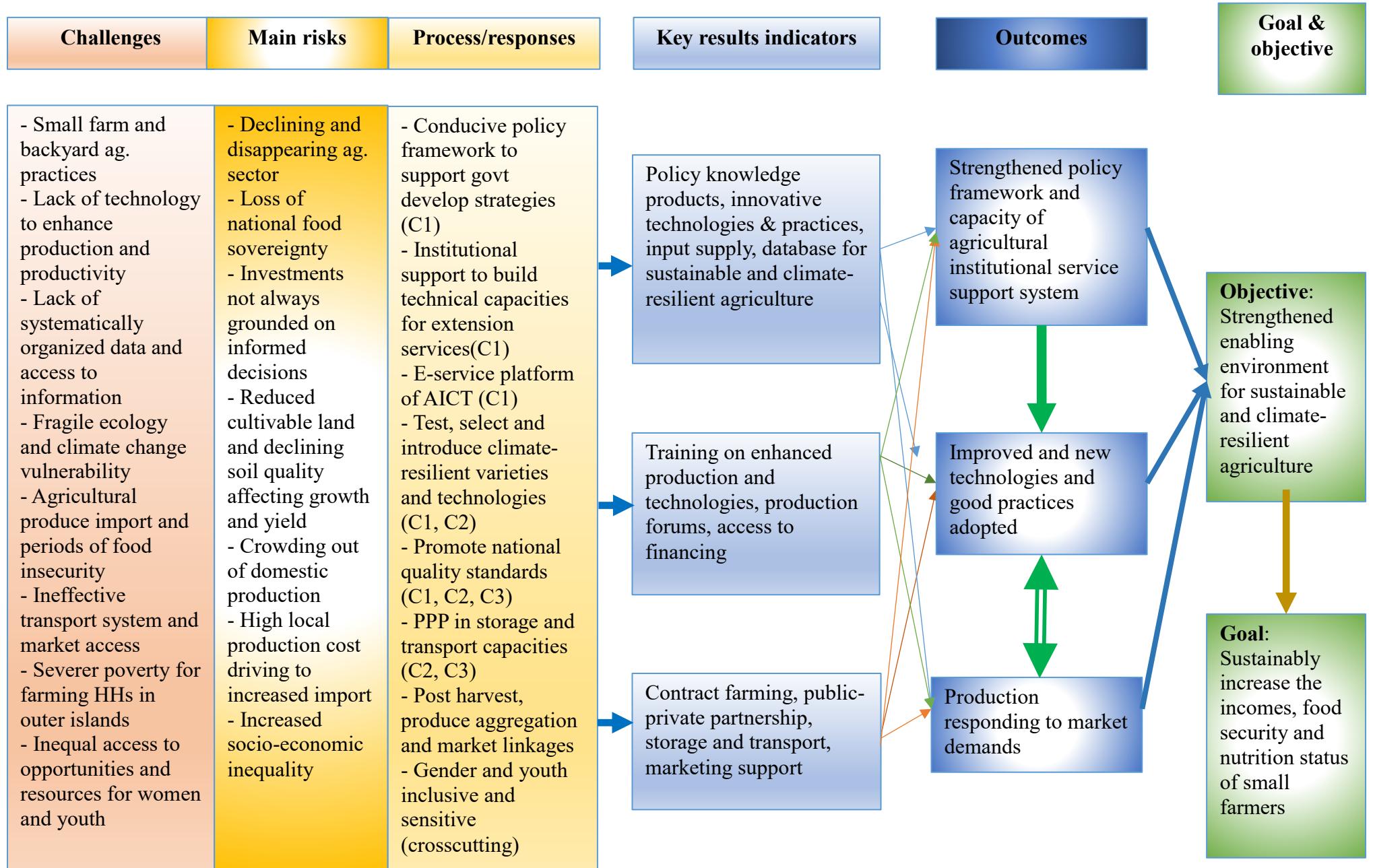
Report No. 0000

Asia and the Pacific Division
Programme Management Department

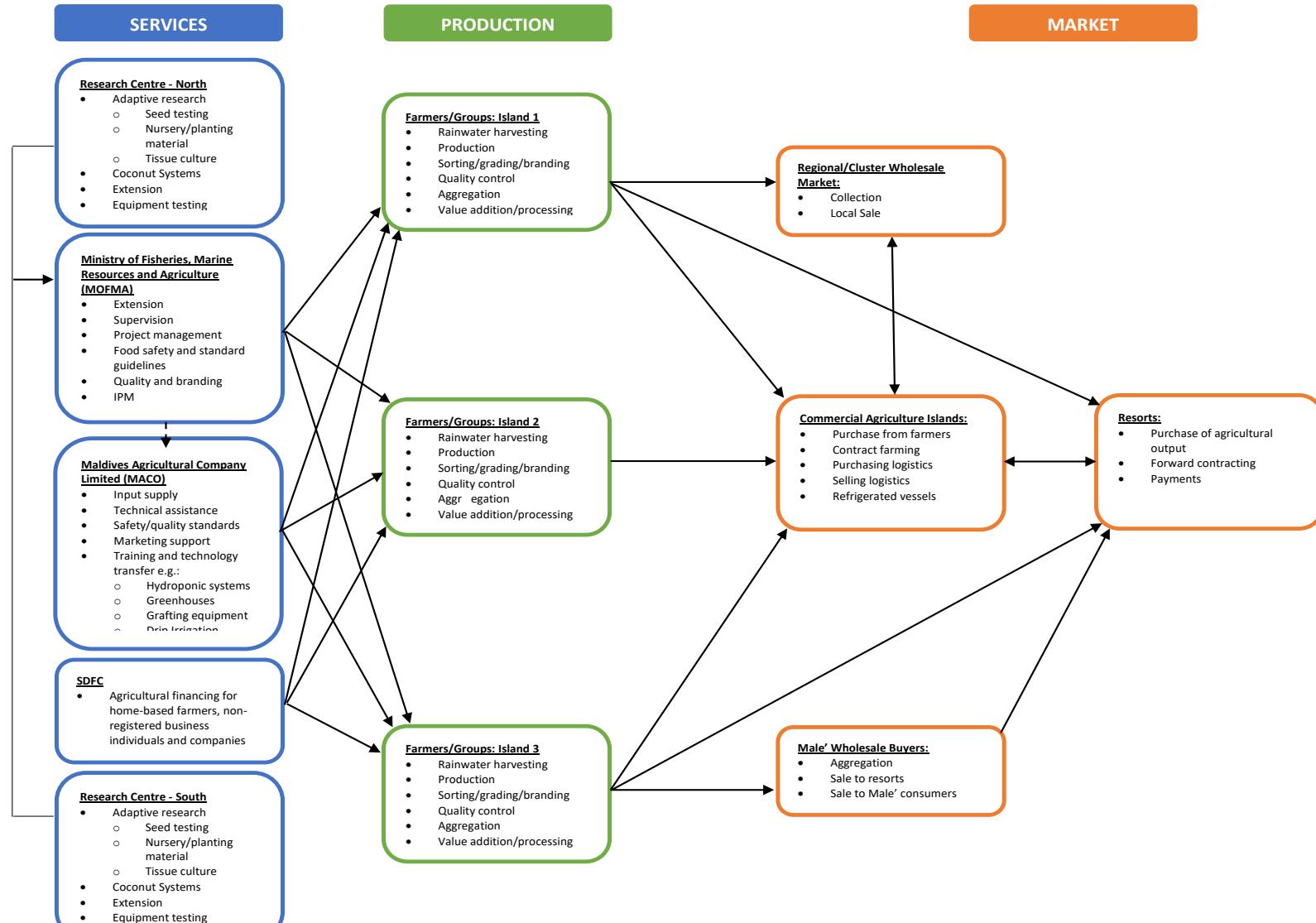
Annex 2. Theory of change

1. More than 10,000 small farm households practising agriculture as registered or non-registered farmers face continued challenges in terms of limited cultivable land areas, lack of access to modern technologies and knowledge to enhance productivity and production, and costly logistics for market connection. This is particularly severe for the 2,870 farming households in the northern atolls in regions 1 –3, where MAP will directly invest in agricultural production and market linkages. Farming in the programme area is mostly practiced in an unorganized manner and at limited scale. Small farmers in the outer atolls suffer the most in terms of periodic food insecurity and poverty. The absence of organized agriculture data also hinders the orientation of public and private investments in the sector. As result, the country has relied heavily on imported agricultural produce and foods.
2. The challenges outlined above have affected the agricultural development in the Maldives, leading to a number of risks such as: (i) declining performance of the agricultural sector that could disappear if the trend is not reversed; (ii) reduced national food sovereignty due to extreme reliance on imports; (iii) lack of well-oriented strategic investments from the public and private sector; (iv) reduced quality and quantity of natural resources for agriculture; and (v) crowding out of local producers due to low cost-effectiveness of agribusiness logistics.
3. Furthermore, despite the increasing feminization of post-harvest activities, there is little evidence of an increase in women's incomes, participation in training, or decision making roles in community organisations. Women are affected by lack of access to technology, finance and leadership roles, with a disproportionate impact on their economic empowerment. Lack of access to productive assets and knowledge also translates into low productivity. This challenge is compounded by the lack of nutrition security, particularly among women and children. The detrimental impact of micronutrients insufficiency on women's productivity is well established.
4. Despite these challenges, there is robust potential for agriculture growth. National efforts are underway to develop a comprehensive and structured policy and incentive framework for the sector. In addition, the Government is considering related investments and activities. Internationally tested and practised climate change mitigation and adaptation technologies and solutions that are suitable for the Maldivian context can be introduced to overcome soil and water management issues. With the steady growth of the economy, the demand and the size of the local market for agricultural output is rising rapidly. With enhanced incomes, consumers are becoming increasingly more aware of nutrition and food safety issues. Furthermore, the tourism sector imports substantial volumes of agricultural commodities per year that could be supplied by the domestic producers.
5. The MAP theory of change is premised on a proactive approach to synergistic investments that build and strengthen the responsiveness and competitiveness of small farm households in organized production, processing, preserving and marketing, supported by the adoption of sustainable and climate-smart technologies and practices. It is based on the assumptions that: (i) small farmers involved in enhanced crop production, post-production management and marketing would benefit from inclusion in a sustainable and business-oriented model; (ii) selection of high value commodities, supported by demand-driven research and improved technical services, would offer small farmers the opportunity to enhance production and meet market demand; (iii) improved management of natural, physical and financial resources would allow small farmers to strengthen climate resilience of production and reduce vulnerability to climate change; (iv) enhanced nutritional status and gender relations at household and community levels, as well as policy engagement on equal opportunities for women, will improve agricultural growth; and, (iv) strategic investments in these areas would contribute to achieving the Agricultural Development Master Plan and generate sustainable increase in the incomes, food security and nutrition of small farmer households.

6. MAP will therefore invest in a number of strategically interlinked priorities – developing the enabling environment of policy, institutions and services, enhancing the climate-smart production of high value commodities, and upgrading market connections between producers and a range of markets. The expected outcomes are an improved policy and incentive framework for the sector, increased productivity and production of agricultural commodities demanded by the market, and development of market linkages and upgraded transportation logistics among organised producers and buyers.



MAP logic model



PRODUCTION

- Farmers/Groups: Island 1**
- Rainwater harvesting
 - Production
 - Sorting/grading/branding
 - Quality control
 - Aggregation
 - Value addition/processing

- Farmers/Groups: Island 2**
- Rainwater harvesting
 - Production
 - Sorting/grading/branding
 - Quality control
 - Aggregation
 - Value addition/processing

- Farmers/Groups: Island 3**
- Rainwater harvesting
 - Production
 - Sorting/grading/branding
 - Quality control
 - Aggregation
 - Value addition/processing

- Regional/Cluster Wholesale Market:**
- Collection
 - Local Sale

- Commercial Agriculture Islands:**
- Purchase from farmers
 - Contract farming
 - Purchasing logistics
 - Selling logistics
 - Refrigerated vessels

- Male' Wholesale Buyers:**
- Aggregation
 - Sale to resorts
 - Sale to Male' consumers

MARKET

- Resorts:**
- Purchase of agricultural output
 - Forward contracting
 - Payments

POLICY SUPPORT: (i) structured holistic agricultural policy framework; (ii) promotion of domestic markets; (iii) incentive framework for resort market to source local production

PARTNERSHIPS: (i) knowledge partnerships for the two research centres; (ii) implementation partnerships for MOFMA/PIU



Investing in rural people

Maldives

Maldives Agribusiness Programme

Project Design Report

Annex 3: Project cost and financing: Detailed costs tables

Mission Dates: 12 - 29 November 2019

Document Date: 22/06/2020

Project No. 2000002416

Report No. 0000

Asia and the Pacific Division
Programme Management Department

Annex 3: Project cost and financing: Detailed costs tables

a. Programme costs

1. The key assumptions underlying the derivation of programme costs are: (i) programme costing is based on November 2019 prices; (ii) consumer price inflation is projected at 1%, as calculated by the Economist Intelligence Unit; (iii) the official exchange rate of MVR 15.35 to USD 1 prevailing in November-December 2019 is the base exchange rate applied; (iv) there are no taxes on agricultural goods nor inputs; any future taxes on goods and services procured under MAP will be financed by the Government; and, (v) physical and price contingencies are estimated at 2% of base costs.

2. The total programme cost amounts to USD 12.9 million (MVR 195.8 billion) over a five-year implementation period. All costs and exchange rates are based on currently prevailing prices/rates in the Maldives. Management amounts to 15% of total costs. Programme costs by component, by expenditure category, and by year are presented in Tables 1-3.

Table 1: Programme costs by component (and sub-components) and financier

(Thousands of United States dollars)

	IFAD LOAN		IFAD Grant		MACO		Private Invest		SDFC		Govt Budget		Total	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
A. Enabling Policy, Institutions and Services														
Knowledge and Technology	736	53.6	578	42.1	-	-	-	-	-	-	58	4.2	1,372	10.6
Input Supply	1,558	86.8	-	-	121	6.8	-	-	-	-	117	6.5	1,795	13.9
Subtotal Enabling Policy, Institutions and Services	2,294	72.4	578	18.3	121	3.8	-	-	-	-	174	5.5	3,167	24.6
B. Climate Smart Production	609	9.9	245	4.0	33	0.5	-	-	5,000	81.3	261	4.2	6,148	47.7
C. Market Connection	382	23.3	100	6.1	-	-	1,140	69.7	-	-	15	0.9	1,637	12.7
D. Programme Management	-	-	293	15.1	-	-	-	-	-	-	1,646	84.9	1,938	15.0
Total PROJECT COSTS	3,285	25.5	1,215	9.4	154	1.2	1,140	8.8	5,000	38.8	2,096	16.3	12,890	100.0

Table 2: Programme costs by expenditure category and financier

(Thousands of United States dollars)

	IFAD LOAN		IFAD Grant		MACO		Private Invest		SDFC		Govt Budget		Total	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
I. Investment Costs														
A. Goods, Equipment and Materials														
Goods, Equipment and Materials	1,705	88.8	-	-	-	-	-	-	-	-	215	11.2	1,919	14.9
B. Technical Assistance and Studies														
International TA	67	13.0	452	87.0	-	-	-	-	-	-	-	-	519	4.0
National TA	546	76.6	13	1.8	121	17.0	-	-	-	-	32	4.5	712	5.5
Studies	-	-	210	100.0	-	-	-	-	-	-	-	-	210	1.6
Subtotal Technical Assistance and Studies	613	42.5	675	46.8	121	8.4	-	-	-	-	32	2.2	1,441	11.2
C. Training and Workshops														
Training and workshops	327	75.6	16	3.7	33	7.6	-	-	-	-	57	13.1	432	3.4
D. Innovation Investments /a	640	30.1	345	16.2	-	-	1,140	53.6	-	-	-	-	2,125	16.5
E. SDFC Financing	-	-	-	-	-	-	-	-	5,000	95.0	261	5.0	5,261	40.8
Total Investment Costs	3,285	29.4	1,035	9.3	154	1.4	1,140	10.2	5,000	44.7	565	5.1	11,179	86.7
II. Recurrent Costs														
A. Salaries and Allowances	-	-	180	11.1	-	-	-	-	-	-	1,448	88.9	1,628	12.6
B. Operational Expenses	-	-	-	-	-	-	-	-	-	-	84	100.0	84	0.7
Total Recurrent Costs	-	-	180	10.5	-	-	-	-	-	-	1,531	89.5	1,711	13.3
Total PROJECT COSTS	3,285	25.5	1,215	9.4	154	1.2	1,140	8.8	5,000	38.8	2,096	16.3	12,890	100.0

Table 3: Programme costs by component and year

(Thousands of United States dollars)

	Totals Including Contingencies					
	PY1	PY2	PY3	PY4	PY5	Total
A. Enabling Policy, Institutions and Services						
Knowledge and Technology	756.5	392.0	101.6	76.9	45.3	1,372.1
Input Supply	1,297.8	135.7	139.1	109.9	112.7	1,795.3
Subtotal Enabling Policy, Institutions and Services	2,054.3	527.7	240.7	186.8	157.9	3,167.4
B. Climate Smart Production	16.7	659.3	2,056.4	1,710.0	1,705.6	6,147.9
C. Market Connection	213.0	388.1	601.8	243.8	190.0	1,636.6
D. Programme Management	414.4	359.5	386.8	365.0	412.4	1,938.1
Total PROJECT COSTS	2,698.4	1,934.6	3,285.6	2,505.6	2,465.8	12,890.0

b. Programme financing/ co-financing strategy and plan

3. IFAD financing is provided as a 73% highly concessional loan and a 27% DSF grant. The programme will be financed by an IFAD loan of USD 3.3 million, an IFAD grant of USD 1.2 million, MACO contribution of USD 0.2 million, private investment (commercial islands, MFLC, beneficiaries) of USD 1.1 million, SDFC cofinancing of USD 5.0 million, and Government contribution in cash of USD 2.1 million. Opportunities to leverage cofinancing from external partners will be sought during implementation.

4. *Climate finance.* The calculated IFAD climate finance for the programme amounts to USD 1,845,026, which represents 41% of the total IFAD financing envelope. This calculated amount represents climate change adaptation finance.

c. Disbursement

5. Withdrawal of funds and use of loan and grant proceeds is governed by IFAD's Loan Disbursement Handbook (LDH) and the Financing Agreement. Applicable procedures for disbursement, financial reporting and maintenance of programme records will be detailed in a Letter to the Borrower/Recipient (LTB/R) upon signature of the Financing Agreement.

6. Three standard disbursement procedures are available for withdrawal of financing: (i) advance withdrawal; (ii) direct payment; and (iii) reimbursement. These are detailed in the LDH and will be outlined in the LTB/R.

7. *Flow of funds.* MAP will open, maintain and operate two Designated Accounts (DAs) denominated in USD in the central bank (Maldives Monetary Authority) to receive the loan and grant proceeds respectively. The DAs will be administered on the basis of imprest arrangements, in which an initial amount of the loan and grant is advanced and then replenished periodically based on justified expenditures. The maximum advances provided by IFAD to the DAs will be established as an authorized allocation in the LTB/R.

8. For all programme expenditure, a payment request will be prepared by the accountant and approved by the finance executive (budget section) and programme director. It will then be submitted to the Ministry of Finance (MoF) based on which funds will be disbursed by the MMA directly to the bank account of the vendor or other payee as required. Expenditure incurred by MACO will follow a similar pattern; the accounts team at MACO will send a payment request to the MoF for which funds will be disbursed by the MMA on approval to the vendor. Except petty cash, no other cash transactions will be permitted by the programme.

9. The counterpart funds from the Government will be recorded in the books of accounts of the PIU. The process for claiming counterpart funds will also be similar to IFAD expenditure, with a payment request being made by the PIU to MOFMRA which in turn will submit it to MoF. On approval by MoF, the MMA will release the funds to the payee as requested. Thus, all funds for the programme implementation will be released by the MMA based on approved payment requests from the PIU, and the PIU will not have any other programme bank account.

10. *Retro-active financing.* Upon Government request, a portion of IFAD financing can be provided as retroactive financing, as an exception to the General Conditions and with Executive Board approval, to cover eligible expenditures between the date of approval of the design document by IFAD and the date of Entry into Force. Activities that can be funded under retroactive financing may be: (i) eligible costs related to MACO set up; (ii) staff recruitment costs and salaries; (iii) purchase of a minimum set of equipment and materials; and (vi) activities related to the baseline survey. To be eligible for retroactive financing, goods and services must have been procured according to IFAD procurement procedures. It is expected that the costs for such activities will not exceed USD 450,000 and will be charged to the respective loan categories. GoM pre-finances retroactive expenditures at its own risk. If the financing is not approved by the Executive Board, or does not enter into force, expenditures will not be reimbursed. The date after which expenditures become eligible for retroactive financing should not be earlier than the programme design date.

11. *Taxes.* All financing and programme expenditure shall be exempt from all taxes. Any applicable taxes will be covered by the GoM contribution to the programme. Social security benefits, if any, (employee's portion) and income tax (employee deductions) are eligible for IFAD financing.

d. Summary of benefits and economic analysis

12. *Beneficiaries.* The programme will directly benefit 6,000 households consisting of 31,800 persons. These consist of 1,720 households benefitting from the full range of investments (training, loans, matching grants, market infrastructure), 4,280 households benefiting from training and market access investments, and 2,460 incremental full time job equivalents created. It will indirectly benefit all small farmers in the Maldives.

13. *Benefits.* The programme will generate a range of social, nutritional, financial, economic and institutional benefits. Financial and economic benefits would accrue from: (i) increased farm productivity and reduced production costs due to the adoption of climate smart technologies; (ii) reduced post-harvest losses and consequent increased proportion of marketed output; (iii) improved quality and safety of agricultural and food products, attracting higher prices and increased sales and net margins; (iv) increased farm incomes through diversification to high value commodities; (v) increased employment for hired labour; (vi) reduced imports and improved balance of payments; and, (vii) increased revenues for the Government as a result of increased volume of taxable production (GST).

14. Nutritional benefits will derive from the substantially greater production of high value commodities which are nutrition-sensitive, such as vegetables, fruits, nuts (both indigenous and conventional) and root crops. Additional intake of vegetables, fruit/nuts and root crops will reduce micronutrient deficiencies, especially among children and women. Nutritionally beneficial incremental vegetable production will include tomato, eggplants, okra, squash, pumpkin, lettuce, cabbage, chilli, bell pepper, microgreens, cucumber, herbs, leeks, onions, watercress, broccoli, string beans and chives, while incremental fruit production will include papaya, banana, citrus, coconuts and mango. Incremental root crop production will focus on sweet potato, taro and yam. Production of nutrition-sensitive crops will be intensified in areas with substantial micronutrient deficiencies, in consultation with Ministry of Health. Production of nutrition-sensitive crops will be accompanied by awareness-raising of nutrition issues.

15. *Financial analysis.* The main results of the financial analysis include: (i) a significant increase in gross and net returns from each model between the without and with project situation; (ii) positive benefit/cost ratios illustrating the worthiness of the investments; the respective NPVs range from USD 3,812 to USD 76,056, while the IRRs range from 12% to 50%, which are comparable to those of existing similar operations in the region. The analysis shows that the models are more sensitive to changes in productivity and price assumptions than they are to variations in investment and operating costs.

16. *Economic analysis.* The economic analysis hinges on the following assumptions: (i) programme life is assumed for 20 years in light of the investments lifecycle; (ii) inputs and outputs are valued at their economic parity prices; (iii) a 7% financial discount rate is applied, which is the same as MMA's refinancing rate (latest update 29 November 2019), and the same rate is used for the economic discount; (iv) the opportunity cost of rural labour is estimated considering the official unemployment rate (6%); as such the shadow wage rate factor is equal to 0.94, or a daily wage of MVR 611 (USD 39.8); (v) the shadow exchange rate factor is 1.04 and the shadow exchange rate, estimated using international trade data, is equal to MVR 16.02 per USD 1.0; (vi) it is assumed that at least 80% of investments will achieve the estimated returns; and (vii) financing flows are included in the calculations as they are already reflected in the production costs.

17. Based on the above, the programme's economic internal rate of return (EIRR) is 12.9% and the economic net present value is USD 9.1 million. This indicates that the programme is a technically and economically viable investment for the economy as a whole.

18. *Sensitivity analysis.* The sensitivity analysis shows that the programme is economically robust in light of potential risks in terms of increased costs, decreased benefits or time overruns. Cost increases by 10%-20%, benefit decreases of 10%-20%, or time overruns of one or two years yield EIRRs that are higher than the opportunity cost of capital and therefore indicate that the proposed investments are indeed robust.

Table 4: Sensitivity Analysis

Sensitivity Analysis (20-year period)	Base case	Costs Increase			Increase of Benefits		Decrease of Benefits			Delay of Benefits	
		+10%	+20%	+50%	+10%	+20%	-10%	-20%	-30%	1 year	2 years
ERR	12.9%	12.4%	11.8%	10.4%	13.5%	14.0%	12.3%	11.6%	10.7%	11.9%	10.8%
ENPV (USD mln)	9.1	8.5	7.8	5.8	10.7	12.2	7.6	6.0	4.4	7.1	5.3

Table 1. Knowledge and Technology

BCD	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1	Republic of Maldives																							
2	Maldives Agribusiness Programme																							
3	Table 1. Knowledge and Technology																							
4	Detailed Costs																							
5	(USD)																							
6																								
7	I. Investment Costs																							
8	A. Upgrading Agriculture Research Center (North) I/a																							
9	1. Equipment and Goods																							
10	Upgrading laboratory facilities /b	lumpsum	1	-	-	-	-	1150,000	150	-	-	-	-	150	152	-	-	-	152 EG_DAFAD_L (90%), GOVT_BUD (10%)		NCB_PM (100%)			
11	Improved greenhouse fitted hydroponic planting gutter space /c	m2	350	-	-	-	-	350	125	44	-	-	-	44	44	-	-	-	44 EG_DAFAD_L (90%), GOVT_BUD (10%)		NCB_PM (100%)			
12	Closed vertical production using artificial light /d	m2	100	-	-	-	-	100	345	35	-	-	-	35	35	-	-	-	35 EG_DAFAD_L (90%), GOVT_BUD (10%)		NCB_PM (100%)			
13	Net houses against insects and shade fitted with hydroponic systems /e	m2	500	-	-	-	-	500	7	4	-	-	-	4	4	-	-	-	4 EG_DAFAD_L (90%), GOVT_BUD (10%)		NCB_PM (100%)			
14	Net houses against bats /f	m2	100	-	-	-	-	100	6	1	-	-	-	1	1	-	-	-	1 EG_DAFAD_L (90%), GOVT_BUD (10%)		NCB_PM (100%)			
15	Concrete apron for compost making	m2	200	-	-	-	-	200	140	28	-	-	-	28	28	-	-	-	28 EG_DAFAD_L (90%), GOVT_BUD (10%)		NCB_PM (100%)			
16	Compost equipment /g	set	1	-	-	-	-	12,500,000	25	-	-	-	-	25	25	-	-	-	25 EG_DAFAD_L (90%), GOVT_BUD (10%)		NCB_PM (100%)			
17	Open field hydroponic production bucket system using drip (set covers 100 m2) /h	set	5	5	-	-	-	10	35	0	0	-	-	0	0	0	0	0	0 EG_DAFAD_L (90%), GOVT_BUD (10%)		NCB_PM (100%)			
18	Reagents, fertilizer, pest control agents (chemicals and biological)	lumpsum	1	1	1	1	1	5	5,500	6	6	6	6	6	6	6	6	6	29 EG_DAFAD_L (90%), GOVT_BUD (10%)		NCB_PM (100%)			
19	Tools like refractometer, tissue and soil nutrition analysis meter, insect catch plates and microscope	lumpsum	1	-	-	-	-	1	5,000	5	-	-	-	5	5	-	-	-	5 EG_DAFAD_L (90%), GOVT_BUD (10%)		NCB_PM (100%)			
20	Open field drip irrigation	set	5	-	-	-	-	5	2,500	13	-	-	-	13	13	-	-	-	13 EG_DAFAD_L (90%), GOVT_BUD (10%)		NCB_PM (100%)			
21	Grafting equipment	set	5	-	-	-	-	5	500	3	-	-	-	3	3	-	-	-	3 EG_DAFAD_L (90%), GOVT_BUD (10%)		NCB_PM (100%)			
22	HDPE drain cell rainwater storage tank dug in to the soil	m3	200	-	-	-	-	200	150	30	-	-	-	30	30	-	-	-	30 EG_DAFAD_L (90%), GOVT_BUD (10%)		NCB_PM (100%)			
23	Rainwater polythene collection sheet with pump sump	m2	500	-	-	-	-	500	1	1	-	-	-	1	1	-	-	-	1 EG_DAFAD_L (90%), GOVT_BUD (10%)		NCB_PM (100%)			
24	Photovoltaic solar system (10 Kw)	set	1	-	-	-	-	13,800	14	-	-	-	-	14	14	-	-	-	14 EG_DAFAD_L (90%), GOVT_BUD (10%)		NCB_PM (100%)			
25	Battery backup (9 KW)	set	1	-	-	-	-	1	7,800	8	-	-	-	8	8	-	-	-	8 EG_DAFAD_L (90%), GOVT_BUD (10%)		NCB_PM (100%)			
26	Subtotal Equipment and Goods							363	6	6	6	6	385	368	6	6	6	392						

27	B. Policy studies	lumpsum	1	1	1	1	-	4	30,000	30	30	30	-	120	30	31	32	33	-	126 TA_DA	IFAD_G (100%)	CON_SRVCS_PM (100%)	
28	C. Knowledge and Technology (ARC)																						
29	1. Adaptive research (inputs)																						
30	Identification of best varieties (various crops)	lumpsum	1	1	1	1	1	5	3,500	4	4	4	4	4	18	4	4	4	4	4	19 EG_DA ^F AD_L (90%), GOVT_BUD (10%)	NCB_PM (100%)	
31	Establishing best hydroponic fertilisation for greenhouse, closed system and field systems	lumpsum	1	1	1	1	1	5	3,500	4	4	4	4	4	18	4	4	4	4	4	19 EG_DA ^F AD_L (90%), GOVT_BUD (10%)	NCB_PM (100%)	
32	Establishing best drip fertigation for open fields (annual crops)	lumpsum	1	1	1	1	1	5	3,500	4	4	4	4	4	18	4	4	4	4	4	19 EG_DA ^F AD_L (90%), GOVT_BUD (10%)	NCB_PM (100%)	
33	Establishing best drip fertigation for open fields (perennial crops)	lumpsum	1	1	1	1	1	5	3,500	4	4	4	4	4	18	4	4	4	4	4	19 EG_DA ^F AD_L (90%), GOVT_BUD (10%)	NCB_PM (100%)	
34	Identification of compost amounts for crop production in open field	lumpsum	1	1	1	1	1	5	3,500	4	4	4	4	4	18	4	4	4	4	4	19 EG_DA ^F AD_L (90%), GOVT_BUD (10%)	NCB_PM (100%)	
35	Development of IPM recommendations for the various crops in greenhouse, closed system and o	lumpsum	1	1	1	1	1	5	3,500	4	4	4	4	4	18	4	4	4	4	4	19 EG_DA ^F AD_L (90%), GOVT_BUD (10%)	NCB_PM (100%)	
36	Development of organic pest recommendations for the various crops in greenhouse, closed syst	lumpsum	1	1	1	1	1	5	3,500	4	4	4	4	4	18	4	4	4	4	4	19 EG_DA ^F AD_L (90%), GOVT_BUD (10%)	NCB_PM (100%)	
37	Preparation of farm budget based on field records for each recommendations developed	lumpsum	1	1	1	1	1	5	3,500	4	4	4	4	4	18	4	4	4	4	4	19 EG_DA ^F AD_L (90%), GOVT_BUD (10%)	NCB_PM (100%)	
38	Preparation of promotion material videos, pamphlet, prospectus for different systems /i	lumpsum	1	1	1	1	1	5	3,500	4	4	4	4	4	18	4	4	4	4	4	19 EG_DA ^F AD_L (90%), GOVT_BUD (10%)	NCB_PM (100%)	
39	Subtotal Adaptive research (inputs)									32	32	32	32	32	158	32	33	34	34	35	168		
40	2. Materials																						
41	Planting material /i	lumpsum	1	1	1	1	1	5	3,500	4	4	4	4	4	18	4	4	4	4	4	19 EG_DA ^F AD_L (90%), GOVT_BUD (10%)	NCB_PM (100%)	
42	Subtotal Knowledge and Technology (ARC)									35	35	35	35	35	175	35	36	37	38	39	186		
43	D. Knowledge and Technology Transfer																						
44	1. Technical assistance (UNOPS)																						
45	Chief Technical Advisor	ers-mon	12	12	-	-	-	24	12,000	144	144	-	-	-	288	146	149	-	-	-	295 TA_DA	IFAD_G (100%)	R_CONTRACT_PM (100%)
46	Unspecified TA	ers-mon	5	5	-	-	-	10	13,000	65	65	-	-	-	130	66	67	-	-	-	133 TA_DA	IFAD_G (100%)	R_CONTRACT_PM (100%)
47	UNOPS management fee	ers-month								11	11	-	-	-	23	12	12	-	-	-	24 TA_DA	IFAD_G (100%)	R_CONTRACT_PM (100%)
48	Subtotal Technical assistance (UNOPS)									220	220	-	-	-	441	223	229	-	-	-	452		
49	2. Technical assistance – extension																						
50	Development of the MGAP protocols for various crops produces	lumpsum	1	1	-	-	-	2	10,000	10	10	-	-	-	20	10	10	-	-	-	21 TA_DA	IFAD_L (100%)	CON_SRVCS_PM (100%)
51	Development of hand book for MGAP implementation	lumpsum	1	1	-	-	-	2	5,000	5	5	-	-	-	10	5	5	-	-	-	10 TA_DA	IFAD_L (100%)	CON_SRVCS_PM (100%)
52	Development of produce standards guided by FAO's Codex Alimentarius	ers-mon	2	-	-	-	-	2	11,000	22	-	-	-	-	22	22	-	-	-	-	22 TA_DA	IFAD_L (100%)	CON_SRVCS_PM (100%)
53	Subtotal Technical assistance – extension									37	15	-	-	-	52	37	16	-	-	-	53		

- 66
- 67 ia To undertake adaptive and collaborative climate smart research
- 68 ib To measure water quality for irrigation, fertility of soils, plant tissue nutrition and identify plant diseases
- 69 ic For humid and hot climate, movable gutter to make space for operation lanes optimizing the use of floor space.
- 70 Unit cost cover installation of foundation, floor, packaging, bath and toilet facilities worth about \$7000.
- 71 id Unit cost cover installation of foundation, floor, packaging, bath and toilet facilities worth about \$7000.
- 72 ie To be used for research cultivation spices and herbs and forestry products including chilli, different herbs, agro forestry products like nuts and fruits and other identified forest product which can be cultivated. It will also be used to determine spacing of trees intercropped with field crops.
- 73 if For fruit research production including mango, papaya, passion fruit, banana, Noni.
- 75 ig Compost equipment including small orchard tractor and full set of implement, trailer and compost making equipment-chopper and turner.
- 76 ih For different crops and fruits
- 77 ii Prepare promotion material videos, pamphlets, prospectus for different systems i.e. greenhouse, closed system, open fields and agro forestry. All material should include simple benefit cost analysis and for capital investment more detailed financial analysis. The prospectus will include scenarios for small farmers using own equity, purchase-hire, and/or debt financing or a mix of the different type of financing.
- 78 ij This work should make use of planting material available from international research institutions and from the commercial market. Identifying and developing hybrid coconuts will receive special attention.
- 79 ik Also for use in the AICT
- 81
- 82
- 83

Table 2. Input Supply

Table 3. Climate Smart Production

Detailed Costs (USD)		Quantities					Base Cost ('000)					Totals Including Contingencies ('000)					Other Accounts			
		Unit	PY1	PY2	PY3	PY4	PY5	Total	Unit	PY1	PY2	PY3	PY4	PY5	Total	Disb.	Acct.	Fin. Rule	Proc. Method	
I. Investment Costs																				
A. Training of farmers																				
IPM training and use&handling of chemical crop protection ag	course	-	12	20	20	-	52	250	-	3	5	5	-	13	-	3	5	5	-	14 TRW_DA AD_L (100%, 100%, 100%, 50%), MACO (0%, 0%, 0%, 50% OTHER_PM (100%)
MGAP and group certification	course	-	12	20	20	-	52	250	-	3	5	5	-	13	-	3	5	5	-	14 TRW_DA AD_L (100%, 100%, 100%, 50%), MACO (0%, 0%, 0%, 50% OTHER_PM (100%)
Management of fertilizer use	course	-	12	20	20	-	52	250	-	3	5	5	-	13	-	3	5	5	-	14 TRW_DA AD_L (100%, 100%, 100%, 50%), MACO (0%, 0%, 0%, 50% OTHER_PM (100%)
Pruning	course	-	12	20	20	-	52	250	-	3	5	5	-	13	-	3	5	5	-	14 TRW_DA AD_L (100%, 100%, 100%, 50%), MACO (0%, 0%, 0%, 50% OTHER_PM (100%)
Compost making	course	-	12	20	20	-	52	250	-	3	5	5	-	13	-	3	5	5	-	14 TRW_DA AD_L (100%, 100%, 100%, 50%), MACO (0%, 0%, 0%, 50% OTHER_PM (100%)
Rain harvesting	course	-	12	20	20	-	52	250	-	3	5	5	-	13	-	3	5	5	-	14 TRW_DA AD_L (100%, 100%, 100%, 50%), MACO (0%, 0%, 0%, 50% OTHER_PM (100%)
Use and management of field drip irrigation	course	-	12	20	20	-	52	250	-	3	5	5	-	13	-	3	5	5	-	14 TRW_DA AD_L (100%, 100%, 100%, 50%), MACO (0%, 0%, 0%, 50% OTHER_PM (100%)
Use and management of field hydroponic	course	-	12	20	20	-	52	250	-	3	5	5	-	13	-	3	5	5	-	14 TRW_DA AD_L (100%, 100%, 100%, 50%), MACO (0%, 0%, 0%, 50% OTHER_PM (100%)
Grafting	course	-	12	20	20	-	52	250	-	3	5	5	-	13	-	3	5	5	-	14 TRW_DA AD_L (100%, 100%, 100%, 50%), MACO (0%, 0%, 0%, 50% OTHER_PM (100%)
Nutritional awareness	course	-	12	20	20	-	52	250	-	3	5	5	-	13	-	3	5	5	-	14 TRW_DA AD_L (100%, 100%, 100%, 50%), MACO (0%, 0%, 0%, 50% OTHER_PM (100%)
Refresher training	course	-	-	12	20	20	52	250	-	-	3	5	5	13	-	-	3	5	6	14 TRW_DA AD_L (100%, 100%, 100%, 50%), MACO (0%, 0%, 0%, 50% OTHER_PM (100%)
Subtotal Training of farmers									-	30	53	55	5	143	-	31	56	60	6	153
B. Financial products																				
Development of financial products	pers-month	0.5	0.5	-	-	-	1	11.000	6	6	-	-	-	11	6	6	-	-	11 TA_DA IFAD_L (100%) :ON_SRVCs_PM (100%)	
Use of financial products	pers-month	0.5	0.5	-	-	-	1	11.000	6	6	-	-	-	11	6	6	-	-	11 TA_DA IFAD_L (100%) :ON_SRVCs_PM (100%)	
Understanding and interpretation of agriculture business plan	pers-month	0.5	0.5	-	-	-	1	11.000	6	6	-	-	-	11	6	6	-	-	11 TA_DA IFAD_L (100%) :ON_SRVCs_PM (100%)	
Subtotal Financial products									17	17	-	-	-	33	17	17	-	-	-	34
C. Production investments																				
Matching grants a/b	lumpsum	-	1	1	-	-	2	350.000	-	350	350	-	-	700	-	350	350	-	-	700 GRANTS_DA IFAD_L (65%), IFAD_G (35%)
SDFC financing	lumpsum	-							-	261	1 650	1 650	1 700	5 261	-	261	1 650	1 650	1 700	5 261 CR_DA GOVT_BUD (0%, 100%, 0%), SDFC (0%, 0%, 100%) NBF_PM (100%)
Subtotal Production investments									-	611	2 000	1 650	1 700	5 961	-	611	2 000	1 650	1 700	5 961
Total									17	658	2 053	1 705	1 705	6 137	17	659	2 056	1 710	1 706	6 148

a Up to 20% of the investment value. To substitute farmers equity for investments if deem necessary. The project will provide matching grants amounting to about USD 700K or approx 500 investment proposals in the first 2 years of the MAP to promote energy saving and climate change adaptation technologies.

b Includes smaller matching grants for homestead vegetable gardening for improved nutritional outcomes

Table 4. Market Connection

BCD	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD
2	Maldives Agribusiness Programme																									
3	Table 4. Market Connection																									
4	Detailed Costs (USD)																									
5																										
6																										
7																										
8																										
9																										
10																										
11																										
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22																										
23																										
24																										
25																										
26	Total																									
27																										
28	la Training to vendors at regional market hubs																									
29	lb Support for Commercial Agriculture Islands (CAI) to engaged farmer from other island in contract farming																									
30	lc To selected CAI at up to 20% of investment costs.																									
31	ld To selected CAI at up to 20% of investment costs.																									
32																										

la Training to vendors at regional market hubs

lb Support for Commercial Agriculture Islands (CAI) to engaged farmer from other island in contract farming

lc To selected CAI at up to 20% of investment costs.

ld To selected CAI at up to 20% of investment costs.

Table 5. Programme Management

Table 6. Disbursement Accounts by Financiers

Table 7. Components by Financiers

Table 8. Expenditure Accounts by Financiers

Table 9. Components Project Cost Summary

Table 10. Expenditure Accounts Project Cost Summary

Republic of Maldives

Maldives Agribusiness Programme

Expenditure Accounts Project Cost Summary

	(MVR Million)						(USD '000)			
				% Total					% Total	
	Local	Foreign	Total	Foreign Exchange	Base Costs	Local	Foreign	Total	Foreign Exchange	Base Costs
I. Investment Costs										
A. Goods, Equipment and Materials										
Goods, Equipment and Materials	-	28.8	28.8	100	15	-	1 876.3	1 876.3	100	15
B. Technical Assistance and Studies										
International TA	-	7.8	7.8	100	4	-	507.0	507.0	100	4
National TA	10.3	-	10.3	-	5	673.0	-	673.0	-	5
Studies	1.5	1.5	3.1	50	2	99.5	99.5	199.0	50	2
Subtotal Technical Assistance and Studies	11.9	9.3	21.2	44	11	772.5	606.5	1 379.0	44	11
C. Training and Workshops										
Training and workshops	6.3	-	6.3	-	3	410.3	-	410.3	-	3
D. Innovation Investments /a										
-	32.6	32.6	32.6	100	17	-	2 125.0	2 125.0	100	17
E. SDFC Financing										
-	80.8	80.8	80.8	100	42	-	5 261.0	5 261.0	100	42
Total Investment Costs	18.2	151.5	169.6	89	87	1 182.8	9 868.8	11 051.5	89	87
II. Recurrent Costs										
A. Salaries and Allowances										
23.6	-	23.6	-	-	12	1 540.0	-	1 540.0	-	12
B. Operational Expenses										
0.8	0.4	1.2	33	1	50.0	25.0	75.0	33	1	
Total Recurrent Costs	24.4	0.4	24.8	2	13	1 590.0	25.0	1 615.0	2	13
Total BASELINE COSTS	42.6	151.9	194.4	78	100	2 772.8	9 893.8	12 666.5	78	100
Physical Contingencies	0.0	0.0	0.1	33	-	2.5	1.3	3.8	33	-
Price Contingencies	0.9	0.4	1.3	29	1	157.2	62.6	219.8	28	2
Total PROJECT COSTS	43.5	152.3	195.8	78	101	2 932.4	9 957.6	12 890.0	77	102

\a MAP (IFAD financing) will provide matching grants up to 20% of the investment cost.

Table 11. Expenditure Accounts by Components - Totals Including Contingencies

(USD '000)	Expenditure Accounts by Components - Totals Including Contingencies	Enabling Policy, Institutions and Services						
		Knowledge and Technology		Climate Input Supply		Market Connection	Programme Management	
		Knowledge	Technology	Smart Production	Market Connection	Programme Management	Total	
I. Investment Costs								
A. Goods, Equipment and Materials								
Goods, Equipment and Materials		577.8	1 165.4	-	150.8	25.3	1 919.4	
B. Technical Assistance and Studies								
International TA		474.4	-	33.8	11.3	-	519.5	
National TA		126.1	536.5	-	4.2	45.3	712.0	
Studies		126.1	-	-	-	83.6	209.7	
Subtotal Technical Assistance and Studies		726.6	536.5	33.8	15.4	128.9	1 441.2	
C. Training and Workshops								
Training and workshops		67.7	93.4	153.1	45.4	72.5	432.1	
D. Innovation Investments /a								
		-	-	700.0	1 425.0	-	2 125.0	
E. SDFC Financing								
		-	-	5 261.0	-	-	5 261.0	
Total Investment Costs		1 372.1	1 795.3	6 147.9	1 636.6	226.7	11 178.6	
II. Recurrent Costs								
A. Salaries and Allowances								
		-	-	-	-	1 627.6	1 627.6	
B. Operational Expenses								
		-	-	-	-	83.8	83.8	
Total Recurrent Costs		-	-	-	-	1 711.4	1 711.4	
Total PROJECT COSTS		1 372.1	1 795.3	6 147.9	1 636.6	1 938.1	12 890.0	
 Taxes								
Foreign Exchange		1 115.2	1 165.4	5 994.8	1 587.1	95.1	9 957.6	

\a MAP (IFAD financing) will provide matching grants up to 20% of the investment cost.

Table 12. Project Components by Year -- Totals Including Contingencies

Republic of Maldives

Maldives Agribusiness Programme

Project Components by Year -- Totals Including Contingencies

(USD '000)

	Totals Including Contingencies					Total
	PY1	PY2	PY3	PY4	PY5	
A. Enabling Policy, Institutions and Services						
Knowledge and Technology	756.5	392.0	101.6	76.9	45.3	1 372.1
Input Supply	1 297.8	135.7	139.1	109.9	112.7	1 795.3
Subtotal Enabling Policy, Institutions and Services	2 054.3	527.7	240.7	186.8	157.9	3 167.4
B. Climate Smart Production	16.7	659.3	2 056.4	1 710.0	1 705.6	6 147.9
C. Market Connection	213.0	388.1	601.8	243.8	190.0	1 636.6
D. Programme Management	414.4	359.5	386.8	365.0	412.4	1 938.1
Total PROJECT COSTS	2 698.4	1 934.6	3 285.6	2 505.6	2 465.8	12 890.0

Table 13. Expenditure Accounts by Years -- Totals Including Contingencies

1	Republic of Maldives					
2	Maldives Agribusiness Programme					
3	Expenditure Accounts by Years -- Totals Including Contingencies					
4	(USD '000)					
5						
6	I. Investment Costs					
7	A. Goods, Equipment and Materials					
8	Goods, Equipment and Materials	1 593.8	78.5	80.3	82.3	84.4
9						1 919.4
10	B. Technical Assistance and Studies					
11	International TA	267.8	251.7	-	-	-
12	National TA	168.2	176.7	120.2	121.9	124.9
13	Studies	63.8	34.2	51.1	32.7	27.9
14						209.7
15	Subtotal Technical Assistance and Studies	499.8	462.7	171.3	154.6	152.9
16						1 441.2
17	C. Training and Workshops					
18	Training and workshops	82.5	117.8	137.0	73.9	21.0
19						432.1
20	D. Innovation Investments /a	195.0	680.0	905.0	195.0	150.0
21						2 125.0
22	E. SDFC Financing	-	261.0	1 650.0	1 650.0	1 700.0
23						5 261.0
24	Total Investment Costs	2 371.1	1 600.0	2 943.5	2 155.8	2 108.2
25						11 178.6
	II. Recurrent Costs					
	A. Salaries and Allowances	311.4	318.3	325.3	332.6	340.0
						1 627.6
	B. Operational Expenses	15.9	16.3	16.8	17.2	17.6
						83.8
	Total Recurrent Costs	327.3	334.6	342.1	349.7	357.6
	Total PROJECT COSTS	2 698.4	1 934.6	3 285.6	2 505.6	2 465.8
						12 890.0
	<i>a MAP (IFAD financing) will provide matching grants up to 20% of the investment cost.</i>					



Investing in rural people

Maldives

Maldives Agribusiness Programme

Project Design Report

Annex 4: Economic and Financial Analysis

Mission Dates: 12 - 29 November 2019

Document Date: 22/06/2020

Project No. 2000002416

Report No. 0000

Asia and the Pacific Division
Programme Management Department

Annex 4: Economic and Financial Analysis

I. Introduction

1. The goal of the MAP is to sustainably increase the incomes, food security and nutrition status of small farmer households. The programme's development objective to support an enabling environment for sustainable and climate-smart agricultural development through strengthened institutional support, improved agricultural productivity and better access to markets and financing resources for small farmer households.
2. The programme will be nationwide in scope covering all 19 atolls, 21 regions comprising 188 inhabited islands of these 98 are inhabited where agriculture is practised on around 800 registered hectares, by approximately 7,800 registered farmers of whom 53% are female and 47% male farmers. In addition, there is around 30% (2,370) non registered farmers, cultivating an estimated 240 hectares. Out of the total 10,170 farmers the programme's target is 6,000 of whom at least 53% should be women, and totalling to 31,800 household members. Also belonging to the programme area is 50 uninhabited islands leased for commercial agriculture, with a total of 956 hectares of land of which 24 islands are actively doing agriculture on 582 hectares of land. The quantifiable tangible benefits will be mainly derived from Component 2: Climate Smart Production, which will initially focus on region 1-3, covering 3 atolls and 40 inhabited islands. Of these, 26 are inhabited agriculture islands with 280 hectares registered land, cultivated by 1,825 registered farmers of whom 56% are women and 44% men. In addition, there is around 30% (545) non registered farmers, cultivating an estimated 85 hectares. Within this production area there are 6 active commercial islands cultivating a total of 250 hectares. The programme's target for Component 2 are 2,150 farming households totalling to 13,975 persons.
3. The programme will have a three-pronged approach to reach its development objective. On one side, the programme, through Component 1, will enhance the capacities of service providers (public and private institutions) in order to strengthen their performance and their interactions. Main benefits will include an increase and strengthening of the commercial agreements between supported smallholder household farmers and MACO, as well as generation and transfer of new/ improved technologies or practices.¹ This group of interventions is expected to cost about 25 per cent of the programme's investment. With almost half of contribution (48 per cent of programme's investment), the MAP will aim to enhance productivity and efficiency of targeted farming households through their increased access to financial services and adoption of new/improved technologies/practices, with particular attention to women and youth. The MAP will provide stimulus in the form of matching grants to leverage financing from the SDFC and the private sector towards energy efficient and climate change adaptation technologies (about 1,720 loans).² Finally, through the promotion of market infrastructure, including refrigerated cargo vessels (about 13 per cent of the investment), the programme will contribute to products' transportation and handling efficiency. The models presented in the economic and financial analysis are aiming to demonstrate how the programme interventions will

¹ The outreach is mostly determined by Component 2's interventions. Beneficiaries include 2,150 farming households investing in improved and diversified production through loans from the SDFC and matching grants provided by the programme, and 3,850 farming households benefitting from inclusive workshops/ trainings and demo plots. Adoption rate is about 80%.

² Under the assumption that an weighted average loan size is about USD 6,870, the financing from the SDFC (min USD 5 million) revolved 2-3 times will be able to generate about 1,720 loans (at an adoption factor of 80% of targeted 2,150 farming households).

generate benefits to the target group, and the potential in employment generation, as well as to assess opportunities for and constraints to economic development and associated risks. They are for demonstration purposes only and are used as building blocks for the MAP approach.

II. Programme Benefits

4. The programme is expected to lead to increased income of farming households and commercial agricultural islands (CAI). Benefits would accrue from: (i) increased farm productivity and reduction of production costs due to the adoption of climate smart technologies; (ii) reduced losses during harvesting; (iii) a subsequent increased proportion of marketed farm produce; (iv) improved quality and safety of agricultural and food products, thus attracting higher prices as a result of the demand by buyers for more reliable outputs and in increased sales and net margins; (v) increased farm income through diversification from sweet potato/banana production to higher value crops; (vi) increased employment opportunities for hired labour; (vii) reduced imports and improved balance of payments; and (viii) increased revenues for the government as a result of increased volume of taxable production (GST). Principal increases in incomes would be largely dependent on farmers accessing dedicated credit lines from the SDFC and benefiting of capacity development interventions from the programme (including technology and knowledge generation and transfer). This will generally contribute to create a favourable economic environment in the programme area, encouraging farmers to produce more competitive products and establish stronger commercial linkages.
5. This Annex presents the Economic and Financial Analysis (EFA) of MAP's interventions through the use of indicative activity models. The analysis builds upon the precautionary principle, accounting for programme benefits in a realistic and conservative manner. A financial analysis is carried out to present the scenarios with and without programme interventions. The key-indicators used to carry out the analysis are the Net Present Values (NPVs), Financial and Economic Internal Rate of Return (FIRR – EIRR), benefit-cost ratios (B/C), switching values for both benefits and costs and the financial return on labour. The aggregation of the models at programme level will allow also estimating the potential for incremental employment generation.

III. Financial Analysis

6. The primary objective of the financial analysis is to determine the financial viability and incentives for the programme's target group as a result of their engagement in programme activities, and hence to examine programme's impacts on family labour, financial flow and household incomes.
7. The economic activities selected for the analysis correspond to the ones with good adoption potential by farming households in the programme area. The analysis presents two sets of models:
 - (i) A first set represents the crop production (100m²) and includes: an open field sweet potato with drip fertigation, an open field banana with drip fertigation, an open field papaya with hydroponic, a greenhouse with hydroponic for cucumber and a closed vertical system for lettuce. All incremental benefits have been estimated in comparison with open field sweet potato and banana production with some supplementary irrigation.
 - (ii) A second set represents four farm models based on the above crop production models by applying the related cropping pattern based on a typical size and structure existing in the programme area (500m²).

8. The above sets of models were used as building blocks for the economic evaluation of the entire programme once aggregated for the phasing of target beneficiaries. All the technical assumptions within the models have been elaborated jointly with the design team members and on the basis of field surveys, national statistics, international and national expert consultation.
9. It is expected that the programme will directly reach around 6,000 households, for an estimated total of 31,800 individual household members. These include 1,720 HHs benefitting of the full range of programme's interventions (loans/matching grants, training, market infrastructure) plus about 4,280 HHs benefiting of only programme's capacity building and market access interventions, and some 2,460 full time equivalent incremental jobs created by the farmers' incremental economic activities³. Overall, the analysis illustrates the consolidated benefits generated by the programme's three investment components and corresponding four sub-components.

Key Assumptions

10. The parameters for the models are based on information gathered during the design mission: interactions with farmers and managers of CAIs, information from donor agencies and development partners, the MOFMRA, the ongoing IFAD-funded projects, other IFI funded projects and mission's estimates. In particular, information on labour and input requirements for various operations, capital costs, prevailing wages, yields, farm gate and market prices of commodities, input and farm-to-market transportation costs were collected. Conservative assumptions were made both for inputs and outputs, and to take into account possible risks.
11. **Prices.** The adopted numerate for the EFA is the domestic price level expressed in local currency unit. The financial prices for programme inputs and products represent average market prices and were collected in the field during the design mission (November 2019). Information on labour requirements for various production models, prevailing wage rates, yields, input use, farm gate and market prices of the products, input prices were collected. Prices used represent estimates of the average seasonal prices, and the analysis was carried out using nominal constant prices. A list of prices used in the analysis is available in the EFA excel files (Working Paper on EFA in Project File).⁴
12. **Exchange rate.** The exchange rate was used in the analysis is set at the rate prevailing at the end of the design mission or USD 1 = MVR 15.35.⁵
13. **Internal rate of return.** An internal rate of return (IRR) of 7%⁶ has been used as a discount rate for the financial analysis to assess the viability and robustness of the investments at farm level. The selection criterion for the IRR is to accept all projects for which the IRR is above the opportunity cost of capital. Using the IRR as the measure, the models' sensitivity to the changes in parameters can be assessed by

³ Actually, these numbers are higher but a conservative approach for outreach indicators has been adopted by applying an 80% adoption factor.

⁴ "MAP Fin Analysis" and "MAP-Econ Analysis" for the financial and economic analyses respectively.

⁵ Maldives Monetary Authority (MMA), 29 November 2019.

⁶ The IRR is a measure of the project's worth that in this case compares the return on the investment with the best alternative use of the funds, i.e. current long-term deposits of 5%. However, a more conservative approach has been applied, and a refinancing rate of the MMA (latest update as of 29 November 2019) was used for the financial analysis.

varying the costs and revenues. The same rate was applied for the social opportunity costs of capital⁷.

14. **Labour.** Family labour has been valued only in economic analysis. An average hired unskilled labour market price of MVR 650 adjusted by local unemployment rate of 6% was applied to calculate its economic value⁸.
15. **Land Taxes.** There is no land tax in Maldives.
16. **Investment and seasonal loans.** All farm models used in the EFA include the use of a loan at prevailing conditions in the programme area from the SDFC, with a 6 per cent interest rate and a two- to three-year duration (in some cases with one-year grace period). It was also assumed that farmers would borrow for agricultural inputs equal to a 3-month provision of operating costs for 6 months at 6 per cent. These are prevailing conditions in the programme area.
17. More details on production and financial parameters for the models are found in the analysis excel tables in the EFA Project files.

Crop production models

18. All models presented below are calculated under the assumption of a trend towards diversification from sweet potato/banana production in open field with some supplementary irrigation. Main investments are represented by drip fertigation, green houses with hydroponic systems, closed vertical systems, grafted trees for the establishment of orchards and other closed facilities. All crop models are based on a 100m² production plot. The main benefits and outcomes of the investments are presented below in Table 1, while the aggregation for the entire programme is based on a potential demand for loans (summarized later, in Section IV of this Annex (IV. Aggregation of MAP benefit streams)).

Table 1. Summary of Financial Crop Production Models (100m²)

Item	Sweet potato	Banan a	Papay a	Cucumbe r	Letter
Returns to labour, MVR	469	501	875	540	554
Returns to HH labour, MVR	1,875	1,170	2,333	23,039	20,851
NPV @7%, MVR	14,948	4,360	38,672	1,112,267	984,043
IRR, %	13%	9%	16%	64%	73%
NPVb, MVR	323,923	202,147	303,221	7,942,332	5,995,682
NPVc, MVR	204,748	132,141	161,784	6,477,868	4,670,308
B/C ratio	1.6	1.5	1.9	1.2	1.3
Switching values Benefits, %	-37%	-35%	-47%	-18%	-22%
Switching values Costs, %	58%	53%	87%	23%	28%

⁷ Inflation was 0.1% in 2019, while it was negative in the previous year, so no adjustment was made to account for this, and the refinancing rate of the MMA was applied for the social cost of capital.

⁸ Current market price for unskilled labour is between MVR 500 to MVR 750, with average of MVR 650

19. **Open field sweet potato – upgrading from some supplementary irrigation to drip fertigation.** The main increase in costs is due to the investment in water tank collection, drip irrigation, photovoltaic system and to raised operating costs, such as improved seeds, organic fertilizers, water Ph control and bio control agents. The prevailing yield of sweet potato in the Without Project (WOP) scenario corresponds to the lower middle productivity of 3kg/m² per cycle, 3 cycles per year, out of which 70% as 1st grade. For the With Project (WP) scenario the sweet potato yield corresponds to the upper middle average yield - 4kg/m² per cycle, 3 cycles per annum, 90% of produce as 1st grade. Operating costs amount MVR 19,327 (about USD 1,259), and net incremental benefits compared to the WOP scenario are MVR 4,668 (USD 304) at full implementation, from the second year onwards. The model presents positive returns. The cash-flow over the period of twenty years, discounted at 7%, produces an NPV of MVR 14,948 (USD 974) with a FIRR of 13% and B/C ratio equal to 1.6.
20. **Open field banana – upgrading from some supplementary irrigation to drip fertigation.** This model is a slight variation of the previous, with banana production instead of sweet potato. The prevailing yield of banana in the WOP scenario is 3kg/m² per cycle, 1 cycle per year, out of which 70% as 1st grade. For WP scenario the banana yield corresponds to 8kg/m² per cycle, 1 cycle per annum with 90% of produce as 1st grade. Operating costs amount MVR 12,581 (about USD 820), and net incremental benefits compared to the WOP scenario are MVR 4,079 (USD 266) at full implementation, from the second year onwards. The model shows positive returns. The cash-flow over the period of twenty years, discounted at 7%, produces an NPV of MVR 4,360 (USD 284) with a FIRR of 9% and B/C ratio equal to 1.5.
21. **Open field papaya – upgrading from some supplementary irrigation to hydroponic system.** The main increase in costs is due to the investment in water tank collection, hydroponic system, photovoltaic system and to raised operating costs, such as improved seedlings, organic fertilizers, water Ph control and bio control agents. The yield of papaya in the WOP scenario is 7.5 kg/m² per cycle, 1 cycle per year, out of which 70% as 1st grade. For the WP scenario the papaya yield is 20kg/m² per cycle, 1 cycle per annum, 90% of produce as 1st grade. Operating costs amount MVR 15,401 (about USD 1,003), and net incremental benefits compared to the WOP scenario are MVR 9,546 (USD 1,784) at full implementation, from the second year onwards. The model presents positive returns. The cash-flow over the period of twenty years, discounted at 7%, produces an NPV of MVR 38,672 (USD 2,519) with a FIRR of 16% and B/C ratio equal to 1.9.
22. **Open field cucumber – upgrading from some supplementary irrigation to a green house with hydroponic system.** The main increase in costs is due to the investment in water tank collection, movable planting trays, hydroponic system, photovoltaic system, ventilation totalling to about MVR 348,445 (USD 22,700) as well as to the raised operating costs, such as improved seeds, organic fertilizers, water Ph control and bio control agents. The yield of cucumber in the WOP scenario is 6 kg/m² per cycle, 5 cycles per year, out of which 70% as 1st grade. For the WP scenario, the cucumber yield is 30kg/m² per cycle, 8.5 cycles per annum, 90% of produce as 1st grade. Operating costs amount MVR 611,465 (about USD 39,835), and net incremental benefits compared to the WOP scenario are MVR 135,729 (USD 8,842) at full implementation, from the second year onwards. The model shows positive returns. The cash-flow over the period of twenty years, discounted at 7%, produces an NPV of MVR 1,112,267 (USD 72,460) with a FIRR of 64% and B/C ratio equal to 1.2.
23. **Open field lettuce – upgrading to closed vertical with hydroponic system.** This model is a slight variation of the previous, with lettuce production instead of cucumber, which also has a significant potential for sale. The main investment is a

complete closed vertical hydroponic system (25m² translate to 100 m² production area) plus 10 m² packaging, for a total amount of MVR 277,221 (USD 18,060). The yield of lettuce in the WOP scenario is 1.5 kg/m² per cycle, 6 cycles per year, out of which 70% as 1st grade. For the WP scenario the cucumber yield is 3.75 kg/m² per cycle, 22 cycles per annum, 90% of produce as 1st grade. Operating costs amount MVR 440,844 (about USD 28,719), and net incremental benefits compared to the WOP scenario are MVR 117,343 (USD 7,645) at full implementation, from the second year onwards. The model presents positive returns. The cash-flow over the period of twenty years, discounted at 7%, produces an NPV of MVR 984,043 (USD 64,107) with a FIRR of 73% and B/C ratio equal to 1.3.

Farm Models

24. Key features of the farm models are presented in Table 2. The above crop production models were scaled up to match the size of land of the potential beneficiaries.

Table 2. Summary of Financial Farm Models

Parameter/Indicator	Farm Models			
	Improved sweet potato and banana production	Improved sweet potato and diversification to papaya	Improved sweet potato and diversification to cucumber	Improved sweet potato and diversification to lettuce
Key assets (production base)	500m ² (WP - 300m ² for potato and 200m ² for banana)	500m ² (WP - 300m ² for potato and 200m ² for papaya)	500m ² (WP - 400m ² for potato and 100m ² for cucumber)	500m ² (WP - 400m ² for potato and 100m ² for lettuce)
Key investment/improvement	Transfer from open field with some irrigation to open field with drip fertigation system (investment in water tank collection, drip irrigation, photovoltaic system)	Transfer from open field with some irrigation to open field with hydroponic system (investment in water tank collection, drip and hydroponic systems, photovoltaic system)	Transfer from open field with some irrigation to green house with hydroponic system (investment in water tank collection, moveable plating trays and hydroponic irrigation system, photovoltaic systems, ventilation)	Transfer from open field with some irrigation to closed vertical system (investment in complete closed vertical hydroponic system (multistore, 25m ² translate to 100 m ² production area), in water tank collection, hydroponic irrigation system, photovoltaic systems, ventilation)
Productivity/production (WOP/WP)	2.7t of sw potato and 0.6t of banana/3.6t of potato and 1.6t of banana	2.7t of sw potato and 0.6t of banana/3.6t of potato and 4t of papaya	3.6t of sw potato and 0.3t of banana/4.8t of potato and 25.5t of cucumber	3.6t of sw potato and 0.3t of banana/4.8t of potato and 8.25t of cucumber
Total incremental investments (US\$) of which:				
- Loan	12,025	14,965	32,320	27,680
- Beneficiary contribution	4,810	5,986	12,928	11,072
	6,013	7,483	16,160	13,840

- Matching grant	1,203	1,497	3,232	2,768
Use of labour (WOP/WP), pd	66/100	66/104	78/352	78/322
Total number of direct beneficiaries of whom:	2 HH	2 HH	4 HH	4 HH
- On-farm hired labour/labourers	1 person	1 person	3 persons	3 persons
Return to labour, US\$/day	30.1	37.6	33.9	34.4
Incremental annual benefits at full development (US\$)	1,421	2,327	10,030	9,175
NPV (US\$)	3,819	10,667	76,056	71,331
IRR	11.8%	17.6%	45.0%	49.6%
B/C ratio	1.6	1.7	1.3	1.3
Switching values Benefits	-36%	-41%	-21%	-25%
Switching values Costs	57%	69%	27%	33%

25. **Summary.** The main results of the financial analysis include: (i) a significant increase in gross and net returns from each model compared with and without-project situation; (ii) sufficient benefit/cost ratios illustrating the worthiness of the investments. The respective NPVs range from USD 3,812 to USD 76,056, while the IRRs from 12% to 50%, which are comparable to those estimated for similar operations in the region. The analysis shows that the models are more sensitive to changes in both productivity and price assumptions than they are to variations in investment and operating costs.
26. **Sensitivity.** While the official rate of inflation is rather stable, the sensitivity analysis shows that all models would remain attractive even if costs increase up to 20%. With regard to **delays in implementation**, the models show a more limited profitability. It is equally important to dedicate sufficient attention to the capacity development interventions, as a way to support the farmers' decisions to diversify to more innovative and higher value crops.
27. The indicative models show a positive return on labour (both, hired and family labour). Favourable cash flows from the possible programme financed investments indicated that the improvements in incomes at the farm level would be sufficient to ensure uptake of the proposed activities. Also, a beneficiary's contribution is likely to translate into a high degree of economic attractiveness.

IV. Economic Analysis

ENPV = USD 9.1 million; ERR = 12.9% (base-case scenario)

28. The objectives of the economic analysis are: (i) to examine the overall programme viability; (ii) to assess the programme's impact and the overall economic rate of return; and (iii) to perform sensitivity analyses upon risks and variables affecting programme's results.
29. **Key Assumptions.** Production models considered in the financial analysis are used as building blocks for determining the viability of the whole programme, once addressing for market distortion and opportunity costs for inputs and outputs. The analysis identifies the quantifiable benefits that relate directly to the activities undertaken following implementation of the programme components, or that can be justifiable attributed to the programme's implementation.

30. The economic analysis of the programme hinges on the following assumptions: (i) programme life has been assumed for 20 years in light of investments lifecycle; (ii) programme inputs and outputs are valued at their economic parity prices; (iii) the financial discount rate used for the analysis is 7%, the same as the refinancing rate of the MMA (latest update 29 November 2019), and the same rate is used for the economic discount; (iv) the opportunity cost of rural labour was estimated considering the official unemployment rate (6%), as such the shadow wage rate factor is equal to 0.94, or a daily wage of MVR 611 (US\$ 39.8); (v) the shadow exchange rate factor (SERF) is 1.04 and the shadow exchange rate (SER), estimated upon international trade data, is equal to MVR 16.02 per USD 1.0; (vi) it was assumed that at least 80 percent of the investments would achieve the estimated returns, i.e. an 80% success rate was applied to the models; and (vii) financing flows have not been undertaken in the calculations as they are already reflected in the production costs.
23. **Programme Economic Costs.** The incremental costs in economic prices have been calculated by the removal of price contingencies and taxes/duties. There are no replacement costs after the MAP completion, however USD 100 thousand have been allocated for support to the ARC to continue research activities started under the MAP. O&M costs have been counted in the calculation of the net incremental benefits of the production models. The total economic cost of the programme amounts to about USD 6.87 million (equivalent to approximately MVR 110 million).
24. **Benefits Estimation.** The illustrative models described above have been used for the calculation of the overall benefit stream of the various investment models above, on the basis of economic prices. The models' specific benefits are then aggregated following the inclusion phasing foreseen for targeted farming households presented in Table 3 below.

Table 3. Phasing of participating beneficiary farming households

Model	PY1	PY2	PY3	PY4	PY5	Total
Improved sweet potato and banana model	0	50	200	250	150	650
Open field with hydroponic papaya model	0	50	200	250	200	700
Green house with hydroponic cucumber model	0	30	60	90	40	220
Closed vertical with hydroponic lettuce model	0	25	50	50	25	150
Total*	0	155	510	640	415	1720

*1,720 is 80% of targeted 2,150 farming households

Results of the Analysis

25. **Overall Estimated Return of the Proposed Programme.** The programme is a technically and economically viable investment to the economy as a whole. The programme's economic NPV of the net benefit stream, discounted at 7%, is USD 9.1 million producing an economic rate of return of 13%, for the base case scenario. The summary of economic analysis is presented in Table 6. The overview of the economic and financial analysis is presented in Figure 1 and Figure 2.
26. **Sensitivity Analysis.** Sensitivity analysis assessed the effect of variations in benefits and costs and for various lags in the realisation of benefits. The results are presented in Table 4. A fall in total programme benefits by 10% would not affect the profitability of the operation. A fall by 20% would reduce the EIRR to 11.6% (10.7% in case of 30% drop in benefits). An increase in total costs does not seem to affect

much the profitability of the programme. Under the assumption of no increase of programme costs, the operation is profitable even with a two-year delay in implementation and realization of benefits (ERR equals 10.8%).

Table 4. Sensitivity Analysis

Sensitivity Analysis (20-year period)	Base case	Costs Increase			Increase of Benefits		Decrease of Benefits			Delay of Benefits	
		+ 10%	+ 20%	+ 50%	+ 10%	+ 20%	- 10%	- 20%	- 30%	1 year	2 years
ERR	12.9%	12.4%	11.8%	10.4%	13.5%	14.0%	12.3%	11.6%	10.7%	11.9%	10.8%
ENPV (USD mln)	9.1	8.5	7.8	5.8	10.7	12.2	7.6	6.0	4.4	7.1	5.3

27. **Risk Analysis.** The main risk of the programme is associated with the delayed adoption of proposed technologies and subsequent disbursement of the loans, which represent 70% of the programme's investment. The quality of production will have to increase in order to gain place in diverse local markets. Investing in capacity development and technical assistance is strategic for the region, and it is important that the programme takes serious monitoring over MACO supposed to deliver inputs and capacity building to suppliers. The programme has a tremendous opportunity also for the environmental sustainability of water through more efficient irrigation systems, accompanying the farming households in selecting crops with high comparative advantages. Other risks of the programme include lack of capacity in implementing agencies and beneficiaries to effectively participate in the programme may result in the delay of realization of benefits. Despite various benefits were not accounted for in the analysis (such as part of the investment in cold storages and transportation means), the programme has a tiny margin of error and requires an attentive implementation.

Table 5. Risk Analysis

$\Delta\%$		Link with the risk matrix	EIR R
Base scenario			12.9 %
Programme benefits	-10%	Combination of risks affecting output prices, productivity and adoption rates	12.3 %
Programme benefits	-30%		10.7 %
Programme costs	10%	Increase of goods costs	12.4 %
Programme costs	20%		11.8 %
1 year lag in ben.		Risks affecting adoption rates and low implementation capacity	11.9 %
2 years lag in ben.			10.8 %

Table 6. MAP - ECONOMIC Net Benefit stream

	Programme Years																				
	Million USD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Benefit Streams:																					
Production benefits		-	-	1.8	-	4.8	-	5.0	-	1.0	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	
Total Benefits		0.0	-1.8	-4.8	-5.0	-1.0	3.9														
Investments																					
Programme Economic Cost (excluding loans*)		2.8	1.3	1.3	0.8	0.7	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
Total Investments		2.8	1.3	1.3	0.8	0.7	0.1														
Incremental Net Benefits		-2.8	-3.1	-6.1	-5.8	-1.7	3.8														
NPV @7% (USD mln)		9.1																			
ERR		12.9%																			

*to avoid double counting

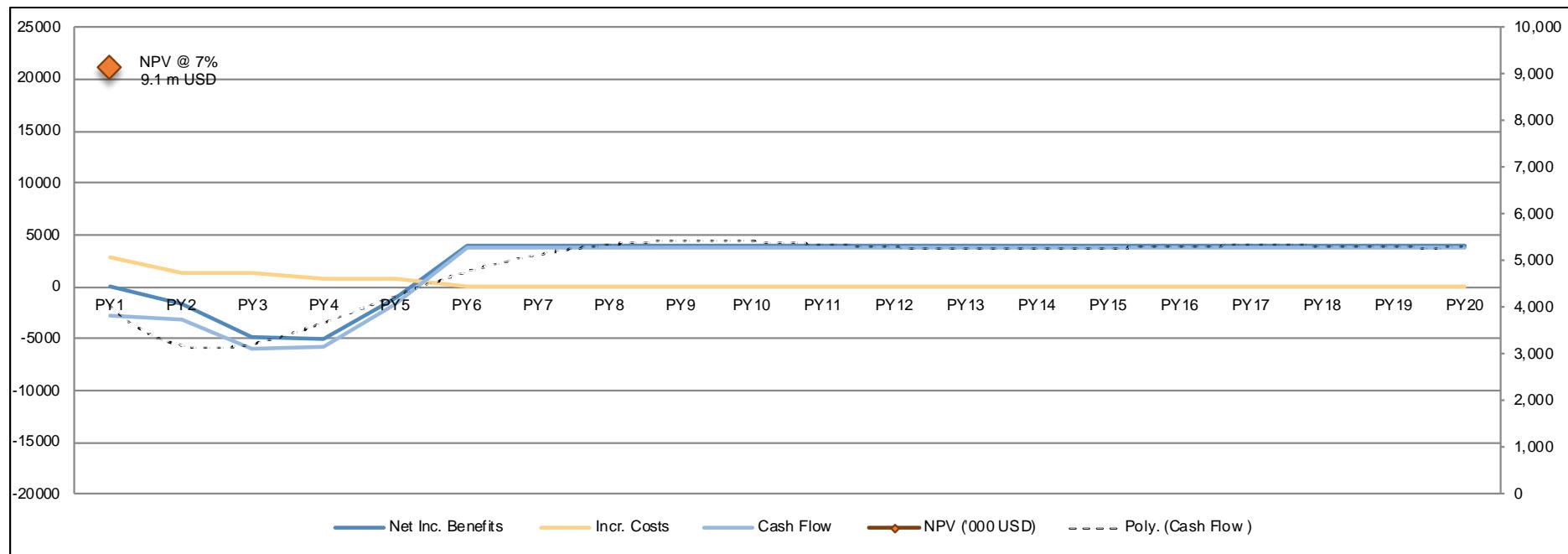
after the MAP completion, USD100 thousand have been allocated to support the ARC to continue work started under the MAP.

Figure 1. Overview of MAP's Financial and Economic Analysis

Republic of Maldives: Maldives Agribusiness Programme (MAP)													
N A N C I A A N A L Y S	CATEGORY	Estimated Investment Costs (US\$)			Annual Net Benefits (US\$)			Annual Inc. net benefits per 1US\$ of Inv.	IRR (%)	NPV (US\$)	Return to labour, US\$/day	Return to family labour, US\$/day	
		MAP (loans&grants)	Beneficiary Contrib.	Total	Without Project	W. Project -Full Dvt	Incremental						
	Improved sweet potato and banana model	6,013	6,013	12,025	1,670	3,091	1,421	0.1	12%	3,819	30.1	1,581	
	Open field with hydroponic papaya model	7,483	7,483	14,965	1,670	3,997	2,327	0.2	18%	10,667	37.6	2,045	
	Green house with hydroponic cucumber model	16,160	16,160	32,320	1,907	11,937	10,030	0.3	45%	76,056	33.9	6,108	
	Closed vertical with hydroponic lettuce model	13,840	13,840	27,680	1,907	11,082	9,175	0.3	50%	71,331	34.4	5,670	
PROJECT COSTS AND INDICATORS FOR LOGFRAME													
	TOTAL Costs	12.89	m US\$	Project Management	1.94	m US\$							
	Base Costs	12.67	m US\$										
	Beneficiaries (direct)	39000		6000 HHs									
	Beneficiaries (including indirect)	39000	people	6000 HHs			Adoption rates	80%					
	Cost per beneficiary	331	US\$/person										
		2,148	US\$/HHs										
Components and Cost (USD million)				Outcomes and Indicators									
	Component 1. Enabling Policy, Institutions and Services					1) laboratory upgraded in ARDC; 2) demonstration plots established for at least new and improved 75 technologies in ARC; 3) at least 10 researches conducted; 3) AICT platform established and functioning; 4) MGAP protocols developed; 5) 52 linkage farmers trained for provision of extension services; 6) MACO is functioning and providing inputs to at least 6,000 farming households.							
		m USD	3.17										
	Component 2. Climate Smart Production					1) At least 2,150 farming households will be trained in modern technologies; 2) at least 2,150 farming households will at least double their production and incomes through SDFC's loans and matching grants provided by the MAP; 3) at least 5 financial products will be developed;							
		m USD	6.15										
	Component 3. Market Connection					1) At least 4 cold storages established under MACO management; 2) demonstration plots established for at least 4 technologies (at least 10 crops) in MACO; 3) at least 5 cold storages installed on transportation vessels; 4) at least 15 new long-term supply contracts operational.							
		m USD	1.64										

	<i>Values in '000 USD</i>	<i>Net Inc. Benefits</i>	<i>Incr. Costs</i>	<i>Net Cash Flow</i>
<i>E C O N O M I C</i>	PY1	0	2751	-2751
	PY2	-1755	1316	-3071
	PY3	-4780	1270	-6050
	PY4	-5007	815	-5822
	PY5	-1029	715	-1743
	PY6	3949	100	3849
	PY7	3949	100	3849
	PY8	3949	100	3849
	PY9	3949	100	3849
	PY10	3949	100	3849
	PY11	3949	100	3849
	PY12	3949	100	3849
	PY13	3949	100	3849
	PY14	3949	100	3849
	PY15	3949	100	3849
	PY16	3949	100	3849
	PY17	3949	100	3849
	PY18	3949	100	3849
	PY19	3949	100	3849
	PY20	3949	100	3849
	NPV ('000 USD)	9,118		
	EIRR	12.9%		

Figure 2. MAP projected costs and benefits flows



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Table 1: Economic Pricing of Commodities

Banana Economic Price	
CIF, USD/KG	0.78
SER	16.0
CIF, MVR/KG	12.5
Custom duty 15%	1.87
Transportation cost from the port to the collection point	1.38
Handling and marketing charges	3.75
Grade adjustment	1.00
Economic Price	20
Financial Price	25.00
CF	0.78

Papaya Economic Price	
CIF USD/KG	2.4
SER	16.0
CIF, MVR/KG	38
Custom duty 15%	5.77
Transportation cost from the port to the collection point	1.38
Handling and marketing charges	11.54
Grade adjustment	0.80
Economic Price	16
Financial Price	15
CF	1.1

Lettuce Economic Price	
CIF, USD/KG	6.0
SER	16.0
CIF, MVR /KG	96.1
Custom duty, 0%	0.00
Transportation cost from the port to the collection point	1.38
Handling and marketing charges	28.84
Grade adjustment	0.90
Economic Price	59
Financial Price	70
CF	0.85

Urea Economic Price	
CIF, USD/KG	0.29
SER	16.0
CIF, MVR /KG	4.6
Custom duty, 0%	0.0
Transportation cost from the port to the collection point	0.8
Marketing charges	0.5
Economic Price	5.9
Financial Price	6.2
CF	0.95

Potassium Sulphate Economic Price	
CIF, USD/KG	0.44
SER	16.0
CIF, MVR/KG	7.0
Custom duty, 0%	0.0
Transportation cost from the port to the collection point	0.8
Marketing charges	0.7
Economic Price	8.5
Financial Price	8.8
CF	0.97

Stanadrd CF to be used in the analysis	0.92
Shadow wage rate (unemployment rate in 2016 at 6%)	94%

Table 2: Shadow Exchange rate factor

Total Imports USD	2 551.6
Total Exports USD	359.6
OER MVR/USD	15.4
Import duties	5.0%
Export taxes	-
SER	16.0
SERF	1.04

Table 3: Economic and Financial Prices

Economic and Financial Analysis Republic of Maldives		MVR:US\$ SCF	### ###	### ###
Maldives Agribusiness Programme (MAP)		Inputs CF Outputs CF	0.96	0.89
Economic and Financial Prices				
Item	Unit	Financial MVR	Economic MVR	Financial US\$
				Economic US\$
Outputs				
Coconut fresh	nut	15.00	13.41	0.98
Papaya	kg	15.00	13.41	0.98
Banana	kg	25.00	22.35	1.63
Cucumber	kg	30.00	26.82	1.95
Lettuce	kg	70.00	62.58	4.56
Sweet potato	kg	26.00	23.24	1.69
Inputs				
Hybrid coconut seedling	unit	28.00	26.82	1.82
Hybrid papaya seedling	unit	4.76	4.56	0.31
Hybrid banana seedling	unit	6.14	5.88	0.40
Cucumber seeds	kg	4.60	4.41	0.30
Lettuce seeds	kg	0.46	0.44	0.03
Sweet potato seeds	kg	0.31	0.30	0.02
Nitrogenous fertilizer	kg	9.96	9.54	0.65
Potassic fertilizer	kg	23.25	22.27	1.51
Urea	kg	6.23	5.97	0.41
Mix fertilizer (nitrogen, phosphorus and potassium)	kg	22.02	21.09	1.43
Organic fertilizer	kg	3.84	3.68	0.25
Cow dung	kg	2.01	1.93	0.13
Nutrients	lt	-	-	0.00
Herbicides	lt	383.75	367.54	25.00
Pesticides	c	383.75	367.54	25.00
Biological pest control	lt	844.25	808.58	55.00
Water Ph control	kg	76.75	73.51	5.00
Detergent	lt	76.75	73.51	5.00
Petrol	lt	12.27	11.75	0.80
Diesel	lt	10.94	10.47	0.71
Electricity	KWh	6.00	5.75	0.39
Packing bag (0.5 kg)	unit	3.00	2.87	0.20
Bag (50kg)	unit	2.00	1.92	0.13
Carton box (7kg)	unit	3.00	2.87	0.20
Plastic crate (15kg)	unit	40.00	38.31	2.61
Transportation (low value crop)	km	2.60	2.49	0.17
Transportation (medium value crop)	ton-km	4.60	4.41	0.30
Transportation (high value crop)	km	8.60	8.24	0.56

Labour					
Family labour	pd	0.00	611	0.00	38.13
Hired labour	pd	728.95	728.95	47.49	45.49
Hired labour	pm	15000.00	#####	977.20	936.17
	year-				
	100m2	10.00	10.00	0.65	0.62
Land lease					

Cost of hired labour

Salary per month, \$	250	25	days	10
Medical, \$	1000	30	days	33.33
Food and lodging, \$	100	30	days	3.33
Air ticket per year, \$	300	365	days	0.82
				47.49 \$/day
				728.95 MVR/day

Table 4: Summary of Farm Models

Parameter/Indicator	Farm Models			
	Improved sweet potato and banana production	Improved sweet potato and diversification to papaya	Improved sweet potato and diversification to cucumber	Improved sweet potato and diversification to lettuce
Key assets (production base) Key investment/improvement	500m2 Transfer from open field with some irrigation to open field with drip fertigation system (investment in water tank collection, drip irrigation, photovoltaic system)	500m2 Transfer from open field with some irrigation to open field with hydroponic system (investment in water tank collection, drip and hydroponic systems, photovoltaic system)	500m2 Transfer from open field with some irrigation to green house with hydroponic system (investment in water tank collection, moveable plating trays and hydroponic irrigation system, photovoltaic systems, ventilation)	500m2 Transfer from open field with some irrigation to closed vertical system (investment in complete closed vertical hydroponic system (multistore, 25m2 translate to 100 m2 production area), in water tank collection, hydroponic irrigation system, photovoltaic systems, ventilation)
Productivity/production (WOP/WP)	2.7t of sw potato and 0.6t of banana/3.6t of potato and 1.6t of banana	2.7t of sw potato and 0.6t of banana/3.6t of potato and 4t of papaya	3.6t of sw potato and 0.3t of banana/4.8t of potato and 25.5t of cucumber	3.6t of sw potato and 0.3t of banana/4.8t of potato and 8.25t of cucumber
Total incremental investments (000'US\$) of which:	11 517	14 333	30 955	26 511
- Loan	6	8	18	15
- Beneficiary contribution	910	600	573	906
- Matching grant	2 303	2 867	6 191	5 302
Use of labour (WOP/WP), pd	303	867	191	302
			78/352	
Total number of direct beneficiaries of whom:	66/100 2 HH	66/104 2 HH	4 HH	78/322 4 HH
- On-farm hired labour/labourers	1 person	1 person	3 persons	3 persons
Return to labour, US\$/day	15.3	22.4	24.0	25.5
Incremental annual benefits at full development (000'US\$)	1	2	7	7
NPV (000'US\$)	270	080	853	626
	2	8	54	56
	688	635	260	018
IRR	10.5%	16.0%	33.9%	40.3%

Table 5: Staple production (sweet potato, WP open field with drip fertigation) - 100 m²

The screenshot shows an Excel spreadsheet with the following key elements:

- Header Row:** A5 contains the title "Staple production (sweet potato, WP open field with drip fertigation) - 100 m²".
- Cells A1-A4:** Economic and Financial Analysis, Republic of Maldives, Maldives Agribusiness Programme (MAP).
- Cell E4:** 1 US\$ = 15.35 MVR.
- Section 5:** Staple production (sweet potato, WP open field with drip fertigation) - 100 m².
- Section 6:** WOP open field with supplementary irrigation.
- Section 7:** Yield /b (kg).
- Section 8:** Crop Inputs (kg): Seed/Seedlings - local, Seed/Seedlings - improved, Chemical fertilizer, Organic fertilizer, Water Ph control, Pesticide, Bio pest control agent, Cow dung, Bags, Diesel for stand-by generator /c, Electricity for pumping water /d, Land lease, Transportation /e.
- Section 9:** Labour (pd): Family labour, Hired labour, Total Labor.
- Section 10:** Investment cost (MVR/100m²): Drip system, Drip distribution system, and water storage (40m³ for use by other crops too), Rainwater Polythene collection sheet (100m²), Storage tank 150m³, Photovoltaic system of 1.5 KWH with battery back for 12 hours/day, Standby generator of 2KWH, Borhole and water pump 3-4 meter, Water pump (1,500 watt).

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y		
1 Economic and Financial Analysis																										
2 Republic of Maldives																										
3 Maldives Agribusiness Programme (MAP)																										
5 Staple production (sweet potato, WP open field with drip fertigation) - 100 m ²																										
6 WOP open field with suplementary irrigation	Unit	WOP	WP (full prod)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20			
38 Water pump (1,500 watt)	MVR/100m ²	2072.25		0.00																						
40 Input/output prices																										
41 1st grade	MVR/kg	19	23	23.24	23.24	23.24	23.24	23.24	23.24	23.24	23.24	23.24	23.24	23.24	23.24	23.24	23.24	23.24	23.24	23.24	23.24	23.24	23.24			
42 2nd grade	MVR/kg	15	19	18.59	18.59	18.59	18.59	18.59	18.59	18.59	18.59	18.59	18.59	18.59	18.59	18.59	18.59	18.59	18.59	18.59	18.59	18.59	18.59			
43 Seed/Seedlings - local	MVR/kg	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24		
44 Seed/Seedlings - improved	MVR/kg	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30		
45 Chemical fertilizer	MVR/kg	21	21	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09		
46 Organic fertilizer	MVR/kg	4	4	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68		
47 Water Ph control	MVR/kg	74	74	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51		
48 Pesticide	MVR/lt	368	368	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54		
49 Bio pest control agent	MVR/lt	809	809	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58		
50 Cow dung	MVR/kg	2	2	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	
51 Bags	MVR/each	2	2	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92	
52 Diesel for stand-by generator /c	MVR/lt	10	10	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47		
53 Electricity for pumping water /d	MVR/kWh	6	6	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	
54 Land lease	MVR/100m ²	10	10	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00		
55 Transportation /e	MVR/ton-km	2.5	2.5	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	
56 Hired labour	MVR/pd	611	611	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00		
58 Gross output																										
59 1st grade	MVR/100m ²	11 715	25 103	25 103	25 103	25 103	25 103	25 103	25 103	25 103	25 103	25 103	25 103	25 103	25 103	25 103	25 103	25 103	25 103	25 103	25 103	25 103	25 103	25 103		
60 2nd grade	MVR/100m ²	4 016	2 231	2 231	2 231	2 231	2 231	2 231	2 231	2 231	2 231	2 231	2 231	2 231	2 231	2 231	2 231	2 231	2 231	2 231	2 231	2 231	2 231	2 231		
61 Sub-total	MVR/100m ²	15 731	27 334	27 334	27 334	27 334	27 334	27 334	27 334	27 334	27 334	27 334	27 334	27 334	27 334	27 334	27 334	27 334	27 334	27 334	27 334	27 334	27 334	27 334		
62 Investment Costs																										
63 Drip system	MVR/100m ²	0	1842	1842																						
64 Drip distribution system	MVR/100m ²	0	921	921																						
65 Water collection from dug in drainage cells, and water storage (40m ³ for use by other crops too)	MVR/100m ²	0	15350	15350																						
66 Rainwater Polythene collection sheet (100m ²)	MVR/100m ²	0	1458	1458																						
67 Storage tank 150m ³	MVR/100m ²	0	7675	7675																						
68 Photovoltaic system of 1.5 KWH with battery back for 12 hours/day	MVR/100m ²	0	5833	5833																						
69 Standby generator of 2KWH	MVR/100m ²	0	1228	1228																						
70 Borhole and water pump 3-4 meter	MVR/100m ²	261	2610	2610																						
71 Water pump (1,500 watt)	MVR/100m ²	207	0	0																						
72 Sub-total	MVR/100m ²	448	35 357	35 357	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1 Economic and Financial Analysis																							
2 Republic of Maldives																							
3 Maldives Agribusiness Programme (MAP)																							
4																							
5 Staple production (sweet potato, WP open field with drip fertigation) - 100 m ²																							
6 WOP open field with suplementary irrigation																							
7																							
71 Water pump (1,500 watt)	MVR/100m ²	207	0	0																			
72 Sub-total	MVR/100m ²	448	35 357	35 357	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
73 Recurrent Costs																							
74 Seed/Seedlings - local	MVR/100m ²	4.750462	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75 Seed/Seedlings - improved	MVR/100m ²	0	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
76 Chemical fertilizer	MVR/100m ²	380	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
77 Organic fertilizer	MVR/100m ²	0	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88
78 Water Ph control	MVR/100m ²	0	515	515	515	515	515	515	515	515	515	515	515	515	515	515	515	515	515	515	515	515	515
79 Pesticide	MVR/100m ²	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
80 Bio pest control agent	MVR/100m ²	0	566	566	566	566	566	566	566	566	566	566	566	566	566	566	566	566	566	566	566	566	566
81 Cow dung	MVR/100m ²	0	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193
82 Bags	MVR/100m ²	34	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46
83 Diesel for stand-by generator /c	MVR/100m ²	0	314	314	314	314	314	314	314	314	314	314	314	314	314	314	314	314	314	314	314	314	314
84 Electricity for pumping water /d	MVR/100m ²	1034	3908	3908	3908	3908	3908	3908	3908	3908	3908	3908	3908	3908	3908	3908	3908	3908	3908	3908	3908	3908	3908
85 Land lease	MVR/100m ²	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
86 Transportation /e	MVR/100m ²	224	299	299	299	299	299	299	299	299	299	299	299	299	299	299	299	299	299	299	299	299	299
87 Hired labour	MVR/100m ²	10998	14664	14664	14664	14664	14664	14664	14664	14664	14664	14664	14664	14664	14664	14664	14664	14664	14664	14664	14664	14664	
88 Sub-total	MVR/100m ²	12 722	20 608	20 608	20 608	20 608	20 608	20 608	20 608	20 608	20 608	20 608	20 608	20 608	20 608	20 608	20 608	20 608	20 608	20 608	20 608	20 608	
89 Gross Margin	MVR/100m ²	2 561	(28 631)	(28 631)	6 726	6 726	6 726	6 726	6 726	6 726	6 726	6 726	6 726	6 726	6 726	6 726	6 726	6 726	6 726	6 726	6 726	6 726	6 726
90 Returns to Family Labor	MVR/pd	427	(4 772)	(4 772)	1 121	1 121	1 121	1 121	1 121	1 121	1 121	1 121	1 121	1 121	1 121	1 121	1 121	1 121	1 121	1 121	1 121	1 121	1 121
91 Incremental net income					(31 191)	4 166	4 166	4 166	4 166	4 166	4 166	4 166	4 166	4 166	4 166	4 166	4 166	4 166	4 166	4 166	4 166	4 166	4 166
92 Benefit/Costs Ratio					1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
93																							
94																							
95																							
96																							
97																							
98																							
99																							
100																							
101																							
102																							
103																							
104																							
105	a WOP-without project, WP-with project at full production																						
106	b 3 cycles per annum, 4kg/m ² for WP and 3kg/m ² for WOP; 90% and 70% for the 1st grade in WP and WOP respectively																						
107	c For WP - 60 days @ 0.5lt per day.																						
108	d For WP: 500W per hour, 4 hours per day, for 340 days; for WOP: 3KWh for 60 days per year.																						
109	e 100km on average																						
110																							
111																							
112																							

Table 6: Banana production (WP open field with drip fertigation system) - 100 m²

MAP-Ec Analysis.xlsx - Excel

Banana production (WP open field with drip fertigation system) - 100 m²

A		B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1	Economic and Financial Analysis																							
2	Republic of Maldives																							
3	Maldives Agribusiness Programme (MAP)																							
4																								
5	Banana production (WP open field with drip fertigation system) - 100 m ²																							
6	WOP open field with supplementary irrigation																							
7		Unit	WOP	WP (full prod)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
11	Crop Inputs																							
12	Seed/Seedlings - local	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	Seed/Seedlings - improved (1.8mX2m)	kg	0	28	28	0	0	0	0	28	0	0	0	0	0	28	0	0	0	28	0	0	0	0
14	Chemical fertilizer	kg	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	Organic fertilizer	kg	0	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
16	Water Ph control	kg	0	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
17	Pesticide	lt	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	Bio pest control agent	lt	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
19	Cow dung	kg	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
20	Carton box	unit	43	114	80	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	
21	Diesel for stand-by generator /c	lt	0	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
22	Electricity for pumping water /d	KWh	180	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680	
23	Land lease	100m ²	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
24	Transportation /e	ton-km	30	80	56	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	
25	Labour																							
26	Family labour	pd	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
27	Hired labour	pd	0	8	6	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	
28	Total Labor	pd	6	14	12	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
29	Investment cost																							
30	Drip system	MVR/100m ²			1842.00	1842																		
31	Drip distribution system	MVR/100m ²			921.00	921																		
32	Water collection from dug in drainage cells, and water storage (40m3 for use by other crops too)	MVR/100m ²			15350.00	15350																		
33	Rainwater Polythene collection sheet (100m ²)	MVR/100m ²			1458.25	1458.25																		
34	Storage tank 150m ³ (plus other crops)	MVR/100m ²			7675.00	7675																		
35	Photovoltaic system of 1.5 KWH with battery back for 12 hours/day	MVR/100m ²			5833.00	5833																		
36	Standby generator of 2KWH	MVR/100m ²			1228.00	1228																		
37	Borehole and water pump 3-4 meter	MVR/100m ²	2609.50		2609.50	2609.5																		
38	Water pump (1,500 watt)	MVR/100m ²	2072.25		0																			
39																								
40	Input/output prices																							

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1 Economic and Financial Analysis																							
2 Republic of Maldives					1 US\$ =	15.35 MVR																	
3 Maldives Agribusiness Programme (MAP)																							
4																							
5 Banana production (WP open field with drip fertigation system) - 100 m ²																							
6 WOP open field with suplementary irrigation																							
7																							
41 Input/output prices																							
42 1st grade	MVR/kg	16	22	22.35	22.35	22.35	22.35	22.35	22.35	22.35	22.35	22.35	22.35	22.35	22.35	22.35	22.35	22.35	22.35	22.35	22.35	22.35	
43 2nd grade	MVR/kg	13	18	17.88	17.88	17.88	17.88	17.88	17.88	17.88	17.88	17.88	17.88	17.88	17.88	17.88	17.88	17.88	17.88	17.88	17.88	17.88	
44 Seed/Seedlings - local	MVR/kg	4	4	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	
45 Seed/Seedlings - improved (1.8mX2m)	MVR/kg	6	6	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	
46 Chemical fertilizer	MVR/kg	21	21	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	
47 Organic fertilizer	MVR/kg	4	4	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	
48 Water Ph control	MVR/kg	74	74	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	
49 Pesticide	MVR/lit	368	368	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	
50 Bio pest control agent	MVR/lit	809	809	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	
51 Cow dung	MVR/kg	2	2	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	
52 Carton box	MVR/each	3	3	2.87	2.87	2.87	2.87	2.87	2.87	2.87	2.87	2.87	2.87	2.87	2.87	2.87	2.87	2.87	2.87	2.87	2.87	2.87	
53 Diesel for stand-by generator /c	MVR/lit	10	10	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	
54 Electricity for pumping water /d	MVR/KWh	6	6	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	
55 Land lease	MVR/100m ²	10	10	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	
56 Transportation /e	MVR/ton-km	4.4	4.4	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41	
57 Hired labour	MVR/pd	611	611	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	
58																							
59 Gross output																							
60 1st grade	MVR/100m ²	3 285	16 092	11 264	16 092	16 092	16 092	16 092	16 092	16 092	16 092	16 092	16 092	16 092	16 092	16 092	16 092	16 092	16 092	16 092	16 092	16 092	
61 2nd grade	MVR/100m ²	1 126	1 430	1 001	1 430	1 430	1 430	1 430	1 430	1 430	1 430	1 430	1 430	1 430	1 430	1 430	1 430	1 430	1 430	1 430	1 430	1 430	
62 Sub-total	MVR/100m ²	4 412	17 522	12 265	17 522	17 522	17 522	17 522	17 522	17 522	17 522	17 522	17 522	17 522	17 522	17 522	17 522	17 522	17 522	17 522	17 522	17 522	
63 Investment Costs																							
64 Drip system	MVR/100m ²	0	1842	1842																			
65 Drip distribution system	MVR/100m ²	0	921	921																			
66 Water collection from dug in drainage cells, and water storage (40m ³ for use by other crops too)	MVR/100m ²	0	15350	15350																			
67 Rainwater Polythene collection sheet (100m ²)	MVR/100m ²	0	1458	1458																			
68 Storage tank 150m ³ (plus other crops)	MVR/100m ²	0	7675	7675																			
69 Photovoltaic system of 1.5 KWH with battery back for 12 hours/day	MVR/100m ²	0	5833	5833																			
70 Standby generator of 2KWH	MVR/100m ²	0	1228	1228																			
71 Borhole and water pump 3-4 meter	MVR/100m ²	261	2610	2610																			
72 Water pump (1,500 watt)	MVR/100m ²	207	0	0																			
73 Sub-total	MVR/100m ²	448	35 357	35 357	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
74																							

Table 7: Papaya production (WP open field with hydroponic system) - 100 m²

MAP-Ec Analysis.xlsx - Excel

The table provides a detailed breakdown of costs and inputs for 100m² of papaya production. It includes columns for Unit, WOP, WP (full prod), and 20 sub-periods (1-20). The 'Investment cost' section lists various equipment and infrastructure items with their respective MVR costs.

A		B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	
1	Economic and Financial Analysis																									
2	Republic of Maldives																									
3	Maldives Agribusiness Programme (MAP)																									
4																										
5	Papaya production (WP open field with hydroponic system) - 100 m ²																									
6	WOP open field with supplementary irrigation																									
7																										
11	Crop Inputs																									
12	Seed/Seedlings - local	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
13	Seed/Seedlings - Improved (1.5mX1.5m)	kg	0	42	42	0	0	0	0	42	0	0	0	0	0	42	0	0	0	0	0	42	0	0	0	
14	Chemical fertilizer	kg	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
15	Organic fertilizer	kg	0	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	
16	Water Ph control	kg	0	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	
17	Pesticide	lt	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
18	Bio pest control agent	lt	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
19	Cow dung	kg	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
20	Carton box	unit	107	286	200	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	
21	Diesel for stand-by generator /c	lt	0	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
22	Electricity for pumping and cooling water /d	KWh	180	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680	
23	Land lease	100m ²	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
24	Transportation /e	ton-km	75	200	140	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	
25	Labour																									
26	Family labour	pd	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
27	Hired labour	pd	0	10	8	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
28	Total Labor	pd	6	16	14	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	
29	Investment cost																									
30	Drip system	MVR/100m ²																								
31	Hydroponic delivery system	MVR/100m ²																								
32	Water collection from dug in drainage cells, and water storage (40m ³ for use by other crops too)	MVR/100m ²	276.3	15350.00	15350																					
33	Rainwater Polythene collection sheet (100m ²)	MVR/100m ²	383.75	1458.25	1458.25																					
34	Storage tank 150m ³ (plus other crops)	MVR/100m ²	1535	7675.00	7675																					
35	Photovoltaic system of 1.5 KWH with battery back for 12 hours/day	MVR/100m ²																								
36	Standby generator of 2KWH	MVR/100m ²																								
37	Borehole and water pump 3-4 meter	MVR/100m ²	260.95	2609.50	2609.5																					
38	Water pump (1,500 watt)	MVR/100m ²	207.23		0																					
39	Bird/insect net	MVR/100m ²	184.20	1842.00	1842.0																					
40	Water cooling unit (750 watt capacity, to be used by other crops)	MVR/100m ²																								
41																										

Table 8: Cucumber production (WP greenhouse with hydroponic system) - 100 m²

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
1 Economic and Financial Analysis																								
2 Republic of Maldives																								
3 Maldives Agribusiness Programme (MAP)																								
4																								
5 Cucumber production (WP greenhouse with hydroponic system) - 100 m ²																								
6 WOP open field with supplementary irrigation	Unit	WOP	WP (full prod)		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
7	pd	46	256	256	256	256	256	256	256	256	256	256	256	256	256	256	256	256	256	256	256	256	256	
29 Total Labor																								
30 Investment cost																								
Natural, plus forced ventilation 100 m ² plus 10 m ² packaging	MVR/100m ²		84425.00	84425																				
Moveable planting trays and hydroponic irrigation system	MVR/100m ²		73680.00	73680																				
Foundation, concrete tiles, toilet and bath facilities	MVR/100m ²		61400.00	61400																				
Water collection from dug in drainage cells (40m ³ dug into the soil)	MVR/100m ²		46050.00	46050																				
Collection from greenhouse roof	MVR/100m ²		1918.75	1918.75																				
Ventilation	MVR/100m ²		7675.00	7675																				
Storage tank 200m ³ (plus other crops)	MVR/100m ²	2302.5	23025.00	23025																				
Photovoltaic system of 9 KWh with battery back for 12 hours/day	MVR/100m ²		21490.00	21490																				
Standby generator of 7KWh	MVR/100m ²		11512.50	11512.5																				
Borehole and water pump 3-4 meter	MVR/100m ²	260.95	0																					
Water pump (1,500 watt)	MVR/100m ²	207.23	0																					
Shade net	MVR/100m ²	4605.00	0.0																					
Water cooling unit	MVR/100m ²		26862.50	26862.5																				
44																								
45 Input/output prices																								
46 1st grade	MVR/kg	19	27	26.82	26.82	26.82	26.82	26.82	26.82	26.82	26.82	26.82	26.82	26.82	26.82	26.82	26.82	26.82	26.82	26.82	26.82	26.82	26.82	
47 2nd grade	MVR/kg	15	21	21.46	21.46	21.46	21.46	21.46	21.46	21.46	21.46	21.46	21.46	21.46	21.46	21.46	21.46	21.46	21.46	21.46	21.46	21.46	21.46	
48 Seed/Seedlings - local	MVR/kg	3	3	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	
49 Seed/Seedlings - improved	MVR/kg	5	5	4.56	4.56	4.56	4.56	4.56	4.56	4.56	4.56	4.56	4.56	4.56	4.56	4.56	4.56	4.56	4.56	4.56	4.56	4.56	4.56	
50 Chemical fertilizer	MVR/kg	21	21	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	21.09	
51 Organic fertilizer	MVR/kg	4	4	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	
52 Water Ph control	MVR/kg	74	74	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	
53 Detergent	MVR/lit	74	74	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	73.51	
54 Pesticide	MVR/lit	368	368	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	367.54	
55 Bio pest control agent	MVR/lit	809	809	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	808.58	
56 Cow dung	MVR/kg	2	2	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	
57 Plastic crate	MVR/each	3	3	2.87	2.87	2.87	2.87	2.87	2.87	2.87	2.87	2.87	2.87	2.87	2.87	2.87	2.87	2.87	2.87	2.87	2.87	2.87	2.87	
58 Diesel for stand-by generator 1c	MVR/lit	10	10	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	
59 Electricity for pumping and cooling water 1d	MVR/Kwh	6	6	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	
60 Land lease	MVR/100m ²	10	10	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00		
61 Transportation /e	MVR/ton-km	4.4	4.4	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41	
62 Hired labour	MVR/pd	611	611	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00	611.00		
63																								
64 Gross output																								
65 1st grade	MVR/100m ²	39 425	615 507	615 507	615 507	615 507	615 507	615 507	615 507	615 507	615 507	615 507	615 507	615 507	615 507	615 507	615 507	615 507	615 507	615 507	615 507	615 507		
66 2nd grade	MVR/100m ²	13 517	54 712	54 712	54 712	54 712	54 712	54 712	54 712	54 712	54 712	54 712	54 712	54 712	54 712	54 712	54 712	54 712	54 712	54 712	54 712	54 712		
67 Sub-total	MVR/100m ²	52 942	670 219	670 219	670 219	670 219	670 219	670 219	670 219	670 219	670 219	670 219	670 219	670 219	670 219	670 219	670 219	670 219	670 219	670 219	670 219	670 219		
68 Investment Costs																								

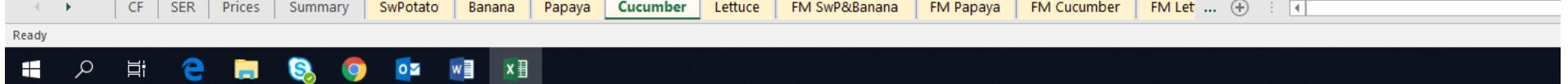


Table 9: Lettuce production (WP closed vertical with hydroponic system) - 100 m²

Table 10: Farm Model (WP improved sweet potato and banana) - 500 m2

			WITH PROJECT 1000 m ²																						
15	16	WOP	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20			
38	Financing Analysis																								
39	Investmens	MVR	176 786																						
40	Repayment Period	years	3																						
41	Grace Period	years	1																						
42	Interest Rate	%	6.0		\$																				
43	Matching Grant	%	10	17 679	1 152																				
44	Beneficiary Contribution	%	50	88 393	5 758																				
45	Loan	MVR	70 714		4 607																				
46																									
47		Without Project																							
48		With Project		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
49	Principal Repayments		0.0	35 357	35 357																				
50	Interest Repayments		2 121	4 243	2 121																				
51	Total Loan Repayments		2 121	39 600	37 479																				
52	Loan Outstanding		70 714	35 357	0																				
53																									
54	Short-term Loan																								
55	Working Capital (3-month operating costs for 6 months)		23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051			
56	Interest Repayment	6	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383			
57																									
58		WOP	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20			
59	Cash Flow Analysis																								
60	Items	Without Project		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
61		Project		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
62	Inflow																								
63	Production Revenues	56 017	117 047	117 047	117 047	117 047	117 047	117 047	117 047	117 047	117 047	117 047	117 047	117 047	117 047	117 047	117 047	117 047	117 047	117 047	117 047	117 047			
64	Long-term Loan		70 714																						
65	Short-term Loan		23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051			
66	Matching Grant		17 679																						
67	Beneficiary's Contribution		88 393																						
68	Total Inflow	56 017	316 885	140 099	140 099	140 099	140 099	140 099	140 099	140 099	140 099	140 099	140 099	140 099	140 099	140 099	140 099	140 099	140 099	140 099	140 099	140 099			
69	Outflow																								
70	Production Costs	50 666	268 992	92 206	92 206	92 206	92 206	92 206	92 206	92 206	92 206	92 206	92 206	92 206	92 206	92 206	92 206	92 206	92 206	92 206	92 206	92 206			
71	Repayment of Loans		0	35 357	35 357	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
72	Long-term Loan		0	35 357	35 357	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
73	Short-term Loan		23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051	23 051			
74	Repayment of Interest on Loans		2 121	4 243	2 121	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
75	Long-term Loan		1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383			
76	Short-term Loan		1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383	1 383			
77	Total Outflow	50 666	295 548	156 241	154 119	116 640	116 640	116 640	116 640	116 640	116 640	116 640	116 640	116 640	116 640	116 640	116 640	116 640	116 640	116 640	116 640	116 640			
78	Net Income after Financing	5 351	21 337	(16 142)	(14 020)	23 458	23 458	23 458	23 458	23 458	23 458	23 458	23 458	23 458	23 458	23 458	23 458	23 458	23 458	23 458	23 458	23 458			
79	Incremental Net Income (AF)		15 986	(21 493)	(19 371)	18 107	18 107	18 107	18 107	18 107	18 107	18 107	18 107	18 107	18 107	18 107	18 107	18 107	18 107	18 107	18 107	18 107			
80																									

Table 11: Farm Model (WP improved sw potato and diversification to papaya) - 500 m²

The screenshot shows a Microsoft Excel spreadsheet titled "MAP-Ec Analysis.xlsx". The spreadsheet is organized into several sections:

- Section 1: Economic and Financial Analysis** (Rows 1-4)
 - Row 1: "Economic and Financial Analysis"
 - Row 2: "Republic of Maldives" and "1 US\$ = 15.35 MVR"
 - Row 3: "Maldives Agribusiness Programme (MAP)"
 - Row 4: Blank
- Section 2: Farm Model (WP improved sw potato and diversification to papaya) - 500 m²** (Rows 5-13)
 - Row 5: Section title
 - Row 6: Blank
 - Row 7: Cropping pattern headers (Area, m², Yield, Production, kg, Revenue, MVR, Investment cost, MVR, Operational costs, MVR, Hired labour, pd, Family labour, pd, Total labour, pd)
 - Row 8: Sub-headers for WOP and WP
 - Row 9: Sw potato open field with irrigation (WOP: 300, WP: 900, Production: 2700, Revenue: 47194, Investment: 1345, Operational: 38166, Hired: 36, Family: 18, Total: 54)
 - Row 10: Banana open field with irrigation (WOP: 200, WP: 300, Production: 600, Revenue: 8824, Investment: 897, Operational: 10258, Hired: -, Family: 12, Total: 12)
 - Row 11: Sw potato open field with drip fertigation (WOP: 300, WP: 1200, Production: 3600, Revenue: 82003, Investment: 106072, Operational: 61824, Hired: 54, Family: 18, Total: 72)
 - Row 12: Papaya open field with hydroponic (WOP: 200, WP: 2000, Production: 4000, Revenue: 52566, Investment: 113937, Operational: 35474, Hired: 20, Family: 12, Total: 32)
 - Row 13: Total values (WOP: 500, WP: 500, Production: 3300, Revenue: 56017, Investment: 2242, Operational: 48424, Hired: 36, Family: 74, Total: 66, Labour: 104)
 - Row 14: Blank
 - Row 15: Blank
- Section 3: WITH PROJECT 1000 m²** (Rows 16-24)
 - Row 16: Headers for WOP (1 through 20)
 - Row 17: Revenue (WOP: 56017, WP: 134569)
 - Row 18: Investment Costs (WOP: 2242, WP: 220008)
 - Row 19: Operational costs (WOP: 48424, WP: 97298)
 - Row 20: Gross Margin (WOP: 5351, WP: 182737)
 - Row 21: Returns to Family Labor (WOP: 178, WP: 6091)
 - Row 22: Incremental net income (WOP: 188088, WP: 31920)
 - Row 23: Benefit/Costs Ratio (WOP: 1.2, WP: 1.4)
 - Row 24: Blank
- Section 4: Financial Metrics (Rows 25-34)**
 - Row 25: Returns to labour (WOP: 358, WP: 1242)
 - Row 26: Returns to HH labour (WOP: 1242, WP: 1242)
 - Row 27: Discount rate (WOP: 7.0%, WP: 132550)
 - Row 28: NPV @ 0.07 (WOP: 132550, WP: 1425630)
 - Row 29: IRR (WOP: 16.0%, WP: 1030775)
 - Row 30: NPVb (WOP: 1425630, WP: 1030775)
 - Row 31: NPVc (WOP: 1030775, WP: 1425630)
 - Row 32: B/C ratio (WOP: 1.38, WP: 1.38)
 - Row 33: Switching values Benefits (WOP: -28%, WP: -28%)
 - Row 34: Switching values Costs (WOP: 38%, WP: 38%)
 - Row 35: Blank

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	Economic and Financial Analysis																					
2	Republic of Maldives						1 US\$ =	15.35 MVR														
3	Maldives Agribusiness Programme (MAP)																					
4																						
5	Farm Model (WP improved sw potato and diversification to papaya) - 500 m2																					
6																						
7	Cropping pattern:	Area, m2		Yield,		Production, kg		Revenue, MVR		Investment cost, MVR		Operational costs, MVR		Hired labour, pd		Family labour, pd		Total labour, pd				
8		WOP	WP			WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP			
9	Sw potato open field with irrigation	300		900	2 700			47 194		1 345		38 166		36		18		54	-			
10	Banana open field with irrigation		200		300	600		8 824		897		10 258		-		12		12	-			
11	Sw potato open field with drip fertigation		300	1 200		3 600			82 003		106 072		61 824		54		18	-	72			
12	Papaya open field with hydroponic		200	2 000		4 000		52 566		113 937		35 474		20		12	-	32				
13	Total	500	500		3 300	7 600	56 017	134 569	2 242	220 008	48 424	97 298	36	74	30	30	66	104				
14																						
15																						
16		WITH PROJECT 1000 m2																				
17		WOP		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
18																						20
19	Financing Analysis																					
20	Investments	MVR	220 008																			
21	Repayment Period	years	3																			
22	Grace Period	years	1																			
23	Interest Rate	%	6.0		\$																	
24	Matching Grant	%	10	22 001	1 433																	
25	Beneficiary Contribution	%	50	110 004	7 166																	
26	Loan	MVR	88 003		5 733																	
27																						
28		Without Project	With Project																			
29			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
30																						20
31	Principal Repayments		0.0	44 002	44 002																	
32	Interest Repayments		2 640	5 280	2 640																	
33	Total Loan Repayments		2 640	49 282	46 642																	
34	Loan Outstanding		88 003	44 002	0																	
35																						
36	Short-term Loan																					
37	Working Capital (3-month operating costs for 6 months)		24 324	24 324	24 324	24 324	24 324	24 324	24 324	24 324	24 324	24 324	24 324	24 324	24 324	24 324	24 324	24 324	24 324	24 324	24 324	
38	Interest Repayment	6	1 459	1 459	1 459	1 459	1 459	1 459	1 459	1 459	1 459	1 459	1 459	1 459	1 459	1 459	1 459	1 459	1 459	1 459	1 459	1 459
39																						
40																						
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50																						
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52																						
53																						
54																						
55																						

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1	Economic and Financial Analysis																					
2	Republic of Maldives						1 US\$ =	15.35 MVR														
3	Maldives Agribusiness Programme (MAP)																					
4																						
5	Farm Model (WP improved sw potato and diversification to papaya) - 500 m2																					
6																						
7	Cropping pattern:		Area, m2		Yield,	Production, kg		Revenue, MVR	Investment cost, MVR	Operational costs, MVR		Hired labour, pd		Family labour, pd		Total labour, pd						
8			WOP	WP		WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	
9	Sw potato open field with irrigation		300		900	2 700		47 194		1 345		38 166		36		18		54		-		
10	Banana open field with irrigation		200		300	600		8 824		897		10 258		-		12		12		-		
11	Sw potato open field with drip fertigation				300	1 200			82 003		106 072		61 824		54		18	-	72			
12	Papaya open field with hydroponic				200	2 000			52 566		113 937		35 474		20		12	-	32			
13	Total		500	500		3 300	7 600	56 017	134 569	2 242	220 008	48 424	97 298	36	74	30	30	66	104			
14																						
15																						
16																						
77																						
78	WITH PROJECT 1000 m2																					
79	Farm model: improved sw potato and papaya																					
80	Returns to labour																					
81	Returns to HH labour																					
82	Discount rate																					
83	NPV @ 0.07																					
84	IRR																					
85	NPVb																					
86	NPVc																					
87	B/C ratio																					
88	Switching values Benefits																					
89	Switching values Costs																					
90																						
91																						

Table 12: Farm Model (WP improved sweet potato and diversification to cucumber) - 500 m2

		MAP-Ec Analysis.xlsx - Excel																		
		Farm Model (WP improved sweet potato and diversification to cucumber) - 500 m2																		
1	Economic and Financial Analysis																			
	Republic of Maldives																			1 US\$ = 15.35 MVR
2		Maldives Agribusiness Programme (MAP)																		
3		Farm Model (WP improved sweet potato and diversification to cucumber) - 500 m2																		
4																				
5																				
6																				
7																				
8		Cropping pattern:																		
9		Area, m2																		
10		WOP WP																		
11		Production, kg																		
12		Revenue, MVR																		
13		Investment cost, MVR																		
14		Operational costs, MVR																		
15		Hired labour, pd																		
16		Family labour, pd																		
17		Total labour, pd																		
18		WOP																		
19		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20																		
20		WITH PROJECT 1000 m2																		
21		Revenue																		
22		Investment Costs																		
23		Operational costs																		
24		Gross Margin																		
25		Returns to labour																		
26		Returns to HH labour																		
27		Discount rate																		
28		NPV @ 0.07																		
29		IRR																		
30		NPVb																		
31		NPVc																		
32		B/C ratio																		
33		Switching values Benefits																		
34		Switching values Costs																		
35																				
36		Financing Analysis																		
37		Investments																		
38		Repayment Period																		
39		Grace Period																		
40		Interest Rate																		
41		\$																		
42		Matching Grant																		
43		Beneficiary Contribution																		
44		Loan																		

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	Economic and Financial Analysis																		
2	Republic of Maldives				1 US\$ =	15.35 MVR													
3	Maldives Agribusiness Programme (MAP)																		
4																			
5	Farm Model (WP improved sweet potato and diversification to cucumber) - 500 m2																		
6																			
7	Cropping pattern:	Area, m2		Yield,		Production, kg		Revenue, MVR		Investment cost, MVR		Operational costs, MVR		Hired labour, pd		Family labour, pd		Total labour, pd	
8		WOP	WP			WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP		
9	Sw potato open field with irrigation	400		900	3 600		62 925		1 794		50 888		48		24		72	-	
10	Banana open field with irrigation	100		300	300		4 412		448		5 129		-		6		6	-	
11	Sw potato open field with drip fertigation		400	1 200		4 800		109 338		141 429		82 432		72		24	-	96	
12	Cucumber green house with hydroponic		100	25 500		25 500		670 219		333 725		567 511		250		6	-	256	
13	Total	500	500	3 900	30 300	67 337	779 556	2 242	475 154	56 017	649 943	48	322	30	30	78	352		
14																			
15																			
16		WITH PROJECT 1000 m2																	
77		WOP	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
78	Farm model: improved sw potato and cucumber																		
79	Returns to labour	341																	
80	Returns to HH labour	3 995																	
81	Discount rate	7.0%																	
82	NPV @ 0.07	993 159																	
83	IRR	#NUM!																	
84	NPVb	9 805 057																	
85	NPVc	8 778 513																	
86	B/C ratio	1.12																	
87	Switching values Benefits	-10%																	
88	Switching values Costs	12%																	
89																			
90																			
91																			
92																			
93																			
94																			
95																			

Table 13. Farm Model (WP improved sw potato and diversification to lettuce) - 500 m²

MAP-Ec Analysis.xlsx - Excel

The table below summarizes the key data from the Farm Model section of the spreadsheet:

	Cropping pattern:		Area, m ²		Yield		Production, kg		Revenue, MVR		Investment cost, MVR		Operational costs, MVR		Hired labour, pd		Family labour, pd		Total labour, pd	
	WOP	WP			WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP		
9	Sw potato open field with irrigation	400		900	3 600		62 925		1 794		50 888		48		24		72	-		
10	Banana open field with irrigation	100		300	300		4 412		448		5 129		-		6		6	-		
11	Sw potato open field with drip fertigation		400	1 200		4 800		109 338		141 429		82 432		72		24		96		
12	Lettuce closed vertical system		100	8 250		8 250		505 949		265 510		406 713		220		6		226		
13	Total		500	500		3 900		13 050		67 337		615 287		2 242		406 938		56 017		
14																				
15																				
16																				
17																				
18																				
19																				
20																				
21																				
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A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	Economic and Financial Analysis																				
2	Republic of Maldives	1 US\$ =	15.35 MVR																		
3	Maldives Agribusiness Programme (MAP)																				
4																					
5	Farm Model (WP improved sw potato and diversification to lettuce) - 500 m ²																				
6																					
7	Cropping pattern:		Area, m ²	Yield,	Production, kg		Revenue, MVR		Investment cost, MVR		Operational costs, MVR		Hired labour, pd		Family labour, pd		Total labour, pd				
8			WOP	WP		WOP	WP		WOP	WP		WOP	WP		WOP	WP		WOP	WP		
9	Sw potato open field with irrigation	400		900	3 600		62 925		1 794		50 888		48		24		72		-		
10	Banana open field with irrigation	100		300	300		4 412		448		5 129		-		6		6		-		
11	Sw potato open field with drip fertigation	400	1 200		4 800		109 338		141 429		82 432		72		24		-	96			
12	Lettuce closed vertical system	100	8 250		8 250		505 949		265 510		406 713		220		6		-	226			
13	Total	500	500		3 900	13 050	67 337	615 287	2 242	406 938	56 017	489 144	48	292	30	30	78	322			
14																					
15																					
16																					
17																					
18																					
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	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	
1	Economic and Financial Analysis																						
2	Republic of Maldives																						
3	Maldives Agribusiness Programme (MAP)																						
4																							
5	Farm Model (WP improved sw potato and diversification to lettuce) - 500 m2																						
6																							
7	Cropping pattern:	Area, m2		Yield,		Production, kg		Revenue, MVR		Investment cost, MVR		Operational costs, MVR		Hired labour, pd		Family labour, pd		Total labour, pd					
8		WOP	WP			WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP				
9	Sw potato open field with irrigation	400		900	3 600			62 925		1 794		50 888		48		24		72	-				
10	Banana open field with irrigation	100		300	300			4 412		448		5 129		-		6		6	-				
11	Sw potato open field with drip fertigation	400		1 200		4 800		109 338		141 429		82 432		72		24	-	96					
12	Lettuce closed vertical system	100		8 250		8 250		505 949		265 510		406 713		220		6	-	226					
13	Total	500	500		3 900	13 050	67 337	615 287	2 242	406 938	56 017	489 144	48	292	30	30	78	322					
14																							
15																							
16		WITH PROJECT 1000 m2																					
71	<i>Repayment of Interest on Loans</i>	WOP	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
72		Long-term Loan	4 883	9 767	4 883	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
73	Short-term Loan	7 337	7 337	7 337	7 337	7 337	7 337	7 337	7 337	7 337	7 337	7 337	7 337	7 337	7 337	7 337	7 337	7 337	7 337	7 337	7 337		
74	Total Outflow	58 259	1 030 589	709 922	705 039	618 768	618 768	618 768	618 768	618 768	618 768	618 768	618 768	618 768	618 768	618 768	618 768	618 768	618 768	618 768	618 768		
75	Net Income after Financing	9 077	113 922	27 651	32 534	118 805	118 805	118 805	118 805	118 805	118 805	118 805	118 805	118 805	118 805	118 805	118 805	118 805	118 805	118 805	118 805	118 805	
76	Incremental Net Income (AF)	104 845	18 574	23 457	109 728	109 728	109 728	109 728	109 728	109 728	109 728	109 728	109 728	109 728	109 728	109 728	109 728	109 728	109 728	109 728	109 728	109 728	
77																							
78	Farm model: improved sw potato and lettuce																						
79	Returns to labour		369																				
80	Returns to HH labour		3 960																				
81	Discount rate		7.0%																				
82	NPV @ 0.07	1 007 855																					
83	IRR	#NUM!																					
84	NPVb	7 721 040																					
85	NPVc	6 680 761																					
86	B/C ratio	1.16																					
87	Switching values Benefits	-13%																					
88	Switching values Costs	16%																					
89																							

Table 14. Phasing of farming households

MAP-Ec Analysis.xlsx - Excel

The screenshot shows an Excel spreadsheet titled "MAP-Ec Analysis.xlsx". The active sheet is titled "Phasing of farming households". The table starts with a header row and includes data for different models. The columns represent Project Years (PY1 to PY6) and a Total column. The data shows projected net benefits for each model, with a note at the bottom indicating 80% of 2,150.

Phasing of farming households																								
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	
1	Economic and Financial Analysis																							
2	Republic of Maldives																							
3	Maldives Agribusiness Programme (MAP)																							
4	(constant 2019 year values)																							
5																								
6	Phasing of farming households																							
7	Model	PY1	PY2	PY3	PY4	PY5	PY6	Total																
8	Improved sweet potato and banana model	0	50	200	250	150	0	650	3126500															
9	Open field with hydroponic papaya model	0	50	200	250	200	0	700	4190200															
10	Green house with hydroponic cucumber model	0	30	60	90	40	0	220	2844160															
11	Closed vertical with hydroponic lettuce model	0	25	50	50	25	0	150	1660800															
12	Total	0	155	510	640	415	0	1720	# #####	6 873														
13									80% of 2,150															
14																								
15	Sw Potato and Banana FM																							
16	Success rate		80%																					
17																								
18	Project Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20			
19	Incremental net benefits per 1 FM, 000'USD	-9.8	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	
20	FMs of PY1																							
21	FMs of PY2		50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	
22	FMs of PY3			200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	
23	FMs of PY4				250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	
24	FMs of PY5					150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	
25	Incremental net benefits of PY1, 000'USD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
26	Incremental net benefits of PY2, 000'USD	-	392.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7		
27	Incremental net benefits of PY3, 000'USD				-1570.7																			
28	Incremental net benefits of PY3, 000'USD					194.6	194.6	194.6	194.6	194.6	194.6	194.6	194.6	194.6	194.6	194.6	194.6	194.6	194.6	194.6	194.6	194.6	194.6	
29	Incremental net benefits of PY4, 000'USD						-1963.4	243.3	243.3	243.3	243.3	243.3	243.3	243.3	243.3	243.3	243.3	243.3	243.3	243.3	243.3	243.3		
30	Incremental net benefits of PY5, 000'USD							-1178.0	146.0	146.0	146.0	146.0	146.0	146.0	146.0	146.0	146.0	146.0	146.0	146.0	146.0			
31	Total incremental net benefits, 000'USD		0.0	-392.7	-1522.1	-691.5	632.5	632.5	632.5	632.5	632.5	632.5	632.5	632.5	632.5	632.5	632.5	632.5	632.5	632.5	632.5	632.5		
32																								
33																								
34	Papaya FM																							
35	Success rate		80%																					
36																								

MAP-Ec Analysis.xlsx - Excel

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	
36																							
37																							
38		Project Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
39	Incremental net benefits per 1 FM, 000'USD		-11.7	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
40	FM's of PY1																						
41	FM's of PY2		50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	
42	FM's of PY3			200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	
43	FM's of PY4				250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	
44	FM's of PY5					200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	
45	Incremental net benefits of PY1, 000'USD																						
46	Incremental net benefits of PY2, 000'USD		-469.6	79.7	79.7	79.7	79.7	79.7	79.7	79.7	79.7	79.7	79.7	79.7	79.7	79.7	79.7	79.7	79.7	79.7	79.7	79.7	
47	Incremental net benefits of PY3, 000'USD			-1878.2	318.8	318.8	318.8	318.8	318.8	318.8	318.8	318.8	318.8	318.8	318.8	318.8	318.8	318.8	318.8	318.8	318.8	318.8	
48	Incremental net benefits of PY4, 000'USD				-2347.8	398.4	398.4	398.4	398.4	398.4	398.4	398.4	398.4	398.4	398.4	398.4	398.4	398.4	398.4	398.4	398.4	398.4	398.4
49	Incremental net benefits of PY5, 000'USD					-1878.2	318.8	318.8	318.8	318.8	318.8	318.8	318.8	318.8	318.8	318.8	318.8	318.8	318.8	318.8	318.8	318.8	
50	Total incremental net benefits, 000'USD		-469.6	-1798.5	-1949.3	-1081.3	1115.6	1115.6	1115.6	1115.6	1115.6	1115.6	1115.6	1115.6	1115.6	1115.6	1115.6	1115.6	1115.6	1115.6	1115.6	1115.6	
51																							
52																							
53																							
54	Cucumber FM																						
55	Success rate		80%																				
56																							
57		Project Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
58	Incremental net benefits per 1 FM, 000'USD		-22.1	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	
59	FM's of PY1																						
60	FM's of PY2		30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
61	FM's of PY3			60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	
62	FM's of PY4				90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	
63	FM's of PY5					40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	
64	Incremental net benefits of PY1, 000'USD																						
65	Incremental net benefits of PY2, 000'USD		-531.2	180.5	180.5	180.5	180.5	180.5	180.5	180.5	180.5	180.5	180.5	180.5	180.5	180.5	180.5	180.5	180.5	180.5	180.5	180.5	
66	Incremental net benefits of PY3, 000'USD			-1062.3	361.1	361.1	361.1	361.1	361.1	361.1	361.1	361.1	361.1	361.1	361.1	361.1	361.1	361.1	361.1	361.1	361.1	361.1	
67	Incremental net benefits of PY4, 000'USD				-1593.5	541.6	541.6	541.6	541.6	541.6	541.6	541.6	541.6	541.6	541.6	541.6	541.6	541.6	541.6	541.6	541.6	541.6	
68	Incremental net benefits of PY5, 000'USD					-708.2	240.7	240.7	240.7	240.7	240.7	240.7	240.7	240.7	240.7	240.7	240.7	240.7	240.7	240.7	240.7	240.7	
69	Total incremental net benefits, 000'USD		-531.2	-881.8	-1051.9	375.1	1324.0	1324.0	1324.0	1324.0	1324.0	1324.0	1324.0	1324.0	1324.0	1324.0	1324.0	1324.0	1324.0	1324.0	1324.0	1324.0	
70																							
71																							
72																							
73	Lettuce FM																						
74	Success rate		80%																				
75																							

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
74 Lettuce FM																					
75 Success rate		80%																			
76																					
77	Project Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
78 Incremental net benefits per 1 FM, 000'USD	-18.1	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	
79 FMs of PY1																					
80 FMs of PY2		25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	
81 FMs of PY3			50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	
82 FMs of PY4				50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	
83 FMs of PY5					25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	
85 Incremental net benefits of PY1, 000'USD																					
86 Incremental net benefits of PY2, 000'USD	-361.8	146.1	146.1	146.1	146.1	146.1	146.1	146.1	146.1	146.1	146.1	146.1	146.1	146.1	146.1	146.1	146.1	146.1	146.1	146.1	
87 Incremental net benefits of PY3, 000'USD		-723.7	292.2	292.2	292.2	292.2	292.2	292.2	292.2	292.2	292.2	292.2	292.2	292.2	292.2	292.2	292.2	292.2	292.2	292.2	
88 Incremental net benefits of PY4, 000'USD			-723.7	292.2	292.2	292.2	292.2	292.2	292.2	292.2	292.2	292.2	292.2	292.2	292.2	292.2	292.2	292.2	292.2	292.2	
89 Incremental net benefits of PY5, 000'USD				-361.8	146.1	146.1	146.1	146.1	146.1	146.1	146.1	146.1	146.1	146.1	146.1	146.1	146.1	146.1	146.1	146.1	
91 Total incremental net benefits , 000'USD	-361.8	-577.5	-285.3	368.8	876.7	876.7	876.7	876.7	876.7	876.7	876.7	876.7	876.7	876.7	876.7	876.7	876.7	876.7	876.7	876.7	
92 Total	Project Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
93 Incremental net benefits of PY1, 000'USD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
95 Incremental net benefits of PY2, 000'USD	0	-1755.2	455.0	455.0	455.0	455.0	455.0	455.0	455.0	455.0	455.0	455.0	455.0	455.0	455.0	455.0	455.0	455.0	455.0	455.0	
96 Incremental net benefits of PY3, 000'USD	0	0	-5234.9	1166.7	1166.7	1166.7	1166.7	1166.7	1166.7	1166.7	1166.7	1166.7	1166.7	1166.7	1166.7	1166.7	1166.7	1166.7	1166.7	1166.7	
97 Incremental net benefits of PY4, 000'USD	0	0	0	-6628.4	1475.6	1475.6	1475.6	1475.6	1475.6	1475.6	1475.6	1475.6	1475.6	1475.6	1475.6	1475.6	1475.6	1475.6	1475.6	1475.6	
98 Incremental net benefits of PY5, 000'USD	0	0.0	0.0	0.0	-4126.3	851.6	851.6	851.6	851.6	851.6	851.6	851.6	851.6	851.6	851.6	851.6	851.6	851.6	851.6	851.6	
100 Total incremental net benefits, 000'USD	0.0	-1755.2	-4779.9	-5006.6	-1029.0	3948.9	3948.9	3948.9	3948.9	3948.9	3948.9	3948.9	3948.9	3948.9	3948.9	3948.9	3948.9	3948.9	3948.9	3948.9	
102 check	0.0	-1755.2	-4779.9	-5006.6	-1029.0	3948.9	3948.9	3948.9	3948.9	3948.9	3948.9	3948.9	3948.9	3948.9	3948.9	3948.9	3948.9	3948.9	3948.9	3948.9	
103																					
104																					
105																					
106																					
107																					
108																					
109																					

Table 15. Project Components by Year -- Totals Including Contingencies

	Economic Costs					Total
	PY1	PY2	PY3	PY4	PY5	
A. Enabling Policy, Institutions and Services						
Knowledge and Technology	773.3	388.7	97.7	72.7	42.1	1 374.6
Input Supply	1 327.8	130.8	130.8	100.8	100.8	1 791.0
Subtotal Enabling Services	2 101.2	519.5	228.5	173.5	142.9	3 165.7
B. Climate Smart Production*	17.2	47.2	53.0	55.0	5.0	177.3
C. Market Connection	220.8	400.8	622.6	249.0	193.2	1 686.3
D. Project Management	411.6	348.0	366.3	338.0	373.5	1 837.4
	2 750.8	1 315.5	1 270.4	815.4	714.5	6 866.7

* excludes loans from the SDFC and project-financed matching grants to avoid double counting

Table 16. Project Economic Return

Economic and Financial Analysis

Republic of Maldives

Maldives Agribusiness Programme (MAP)

(constant 2019 year values)

	Million USD	Programme Years																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Benefit Streams:																					
Production benefits		-	1.8	4.8	5.0	1.0	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Total Benefits		0.0	1.8	4.8	5.0	1.0	3.9														
Investments																					
Programme Economic Cost (excluding loans*)		2.8	1.3	1.3	0.8	0.7	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total Investments		2.8	1.3	1.3	0.8	0.7	0.1														
Incremental Net Benefits		-2.8	3.1	6.1	5.8	1.7	3.8														
NPV @7% (USD mn)		9.1																			
ERR		12.9%																			

*to avoid double counting

after the MAP completion, USD100 thousand have been allocated to support the ARC to continue work started under the project

Table 17. Sensitivity

MAP-Ec Analysis.xlsx - Excel

The table below summarizes the key data from the sensitivity analysis:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W			
1	Economic and Financial Analysis																									
2	Republic of Maldives																									
3	Maldives Agribusiness Programme (MAP)																									
4	(constant 2019 year values)																									
5	(mln USD)																									
6	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	ERR	NPV a/			
8	Incremental Benefits	0.0	-1.8	-4.8	-5.0	-1.0	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9		
9	benefits +10%	0.0	-1.9	-5.3	-5.5	-1.1	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3		
10	benefits +20%	0.0	-2.1	-5.7	-6.0	-1.2	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
11	benefits -10%	0.0	-1.6	-4.3	-4.5	-0.9	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6		
12	benefits -20%	0.0	-1.4	-3.8	-4.0	-0.8	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2		
13	benefits -30%	0.0	-1.2	-3.3	-3.5	-0.7	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8		
15	Program Costs	2.8	1.3	1.3	0.8	0.7	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
16	costs +10%	3.0	1.4	1.4	0.9	0.8	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
17	costs +20%	3.3	1.6	1.5	1.0	0.9	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
18	costs +50%	4.1	2.0	1.9	1.2	1.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2		
21	Net cash flow	-2.8	-3.1	-6.1	-5.8	-1.7	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8		
22	base scenario	-2.8	-3.1	-6.1	-5.8	-1.7	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8		
23	costs +10%	-3.0	-3.2	-6.2	-5.9	-1.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8		
24	costs +20%	-3.3	-3.3	-6.3	-6.0	-1.9	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8		
25	costs +50%	-4.1	-3.7	-6.7	-6.2	-2.1	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8		
26	benefits +10%	-2.8	-3.2	-6.5	-6.3	-1.8	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2		
27	benefits +20%	-2.8	-3.4	-7.0	-6.8	-1.9	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6		
28	benefits -10%	-2.8	-2.9	-5.6	-5.3	-1.6	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		
29	benefits -20%	-2.8	-2.7	-5.1	-4.8	-1.5	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1		
30	benefits -30%	-2.8	-2.5	-4.6	-4.3	-1.4	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7		
31	benefits delayed 1 year	-2.8	-1.3	-3.0	-5.6	-5.7	-1.1	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8		
32	benefits delayed 2 years	-2.8	-1.3	-1.3	-2.6	-5.5	-5.1	-1.1	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8		
33	a/ Discount rate	7%																								
35	Sensitivity Analysis (20-year period)	Base case	Costs Increase			Increase of Benefits			Decrease of Benefits			Delay of Benefits														
36			+10%	+20%	+50%	+10%	+20%	-10%	-20%	-30%	1 year	2 years														
37	ERR	12.9%	12.4%	11.8%	10.4%	13.5%	14.0%	12.3%	11.6%	10.7%	11.9%	10.8%														
38	ENPV (USD mln)	9.1	8.5	7.8	5.8	10.7	12.2	7.6	6.0	4.4	7.1	5.3														
39	Discount rate	7%																								
40																										

Table 18. Summary

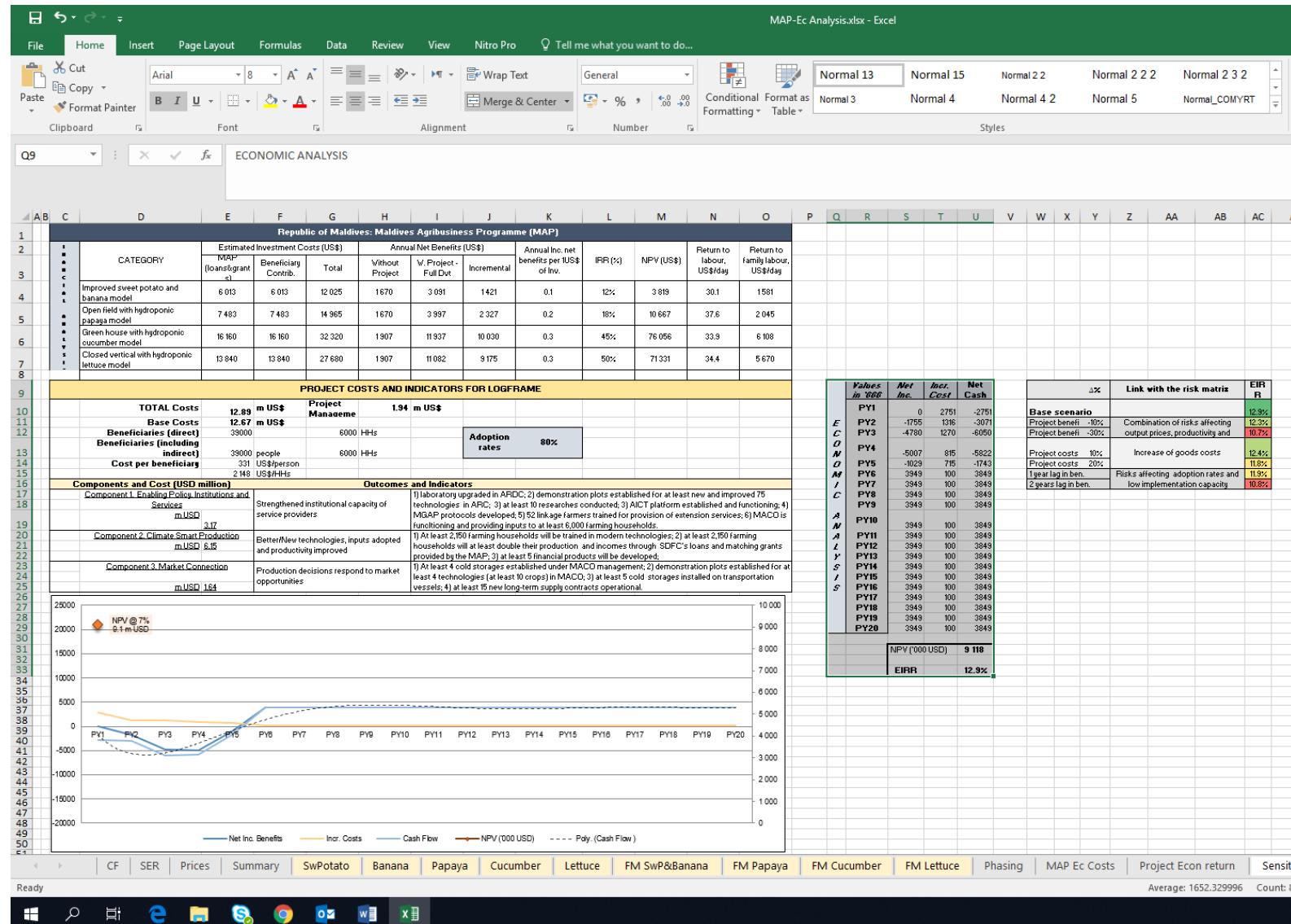


Table 19: Pricing of Commodities

Banana Economic Price	
CIF, USD/KG	0.78
SER	16.0
CIF, MVR/KG	12.5
Custom duty 15%	1.87
Transportation cost from the port to the collection point	1.38
Handling and marketing charges	3.75
Grade adjustment	1.00
Economic Price	20
Financial Price	25.00
CF	0.78

Papaya Economic Price	
CIF USD/KG	2.4
SER	16.0
CIF, MVR/KG	38
Custom duty 15%	5.77
Transportation cost from the port to the collection point	1.38
Handling and marketing charges	11.54
Grade adjustment	0.80
Economic Price	16
Financial Price	15
CF	1.1

Lettuce Economic Price	
CIF, USD/KG	6.0
SER	16.0
CIF, MVR /KG	96.1
Custom duty, 0%	0.00
Transportation cost from the port to the collection point	1.38
Handling and marketing charges	28.84
Grade adjustment	0.90
Economic Price	59
Financial Price	70
CF	0.85

Urea Economic Price	
CIF, USD/KG	0.29
SER	16.0
CIF, MVR /KG	4.6
Custom duty, 0%	0.0
Transportation cost from the port to the collection point	0.8
Marketing charges	0.5
Economic Price	5.9
Financial Price	6.2
CF	0.95

Potassium Sulphate Economic Price	
CIF, USD/KG	0.44
SER	16.0
CIF, MVR/KG	7.0
Custom duty, 0%	0.0
Transportation cost from the port to the collection point	0.8
Marketing charges	0.7
Economic Price	8.5
Financial Price	8.8
CF	0.97
Stanadrd CF to be used in the analysis	0.92
Shadow wage rate (unemployment rate in 2019 at 6%)	94%

Table 20: Shadow Exchange Rate

Total Imports USD	² 551.6
Total Exports USD	359.6
OER MVR/USD	15.4
Import duties	5.0%
Export taxes	-
SER	16.0
SERF	1.04

Table 21: Economic and Financial Prices

Economic and Financial Analysis				MVR:US\$	15.35	16.02	SER
Republic of Maldives				SCF	0.92		
Maldives Agribusiness Programme (MAP)				Inputs CF	0.96		
Economic and Financial Prices				Outputs CF	0.89		
Item	Unit	Financial	Economic	Financial	Economic		
		MVR	MVR	USD	USD		
Outputs							
Coconut fresh	nut	15.00	13.41	0.98	0.87		
Papaya	kg	15.00	13.41	0.98	0.87		
Banana	kg	25.00	22.35	1.63	1.46		
Cucumber	kg	30.00	26.82	1.95	1.75		
Lettuce	kg	70.00	62.58	4.56	4.08		
Sweet potato	kg	26.00	23.24	1.69	1.51		
Inputs							
Hybrid coconut seedling	unit	28.00	26.82	1.82	1.75		
Hybrid papaya seedling	unit	4.76	4.56	0.31	0.30		
Hybrid banana seedling	unit	6.14	5.88	0.40	0.38		
Cucumber seeds	kg	4.60	4.41	0.30	0.29		
Lettuce seeds	kg	0.46	0.44	0.03	0.03		
Sweet potato seeds	kg	0.31	0.30	0.02	0.02		
Nitrogenous fertilizer	kg	9.96	9.54	0.65	0.62		
Potassic fertilizer	kg	23.25	22.27	1.51	1.45		
Urea	kg	6.23	5.97	0.41	0.39		
Mix fertilizer (nitrogen, phosphorus and potassium)	kg	22.02	21.09	1.43	1.37		
Organic fertilizer	kg	3.84	3.68	0.25	0.24		
Cow dung	kg	2.01	1.93	0.13	0.13		
Nutrients	lt	-	-	0.00	-		
Herbicides	lt	383.75	367.54	25.00	23.94		
Pesticides	c	383.75	367.54	25.00	23.94		
Biological pest control	lt	844.25	808.58	55.00	52.68		
Water Ph control	kg	76.75	73.51	5.00	4.79		
Detergent	lt	76.75	73.51	5.00	4.79		
Petrol	lt	12.27	11.75	0.80	0.77		
Diesel	lt	10.94	10.47	0.71	0.68		
Electricity	KWh	6.00	5.75	0.39	0.37		
Packing bag (0.5 kg)	unit	3.00	2.87	0.20	0.19		
Bag (50kg)	unit	2.00	1.92	0.13	0.12		
Carton box (7kg)	unit	3.00	2.87	0.20	0.19		
Plastic crate (15kg)	unit	40.00	38.31	2.61	2.50		
Transportation (low value crop)	ton-km	2.60	2.49	0.17	0.16		
Transportation (medium value crop)	ton-km	4.60	4.41	0.30	0.29		
Transportation (high value crop)	ton-km	8.60	8.24	0.56	0.54		
Labour							
Family labour	pd	0.00	611	0.00	39.80		
Hired labour	pd	728.95	728.95	47.49	47.49		
Hired labour	pm year- 100m2	15000.00	15000.00	977.20	977.20		
Land lease							
Cost of hired labour							
Salary per month, \$	250	25	days	10			
Medical, \$	1000	30	days	33.33			

Food and lodging, \$	100	30	days	3.33
Air ticket per year, \$	300	365	days	0.82
				47.49 \$/day
				728.95 MVR/day

Current market price for unskilled labour is between MVR 500 to MVR 750, with average of MVR 650

Table 4: Summary of Farm Models

Parameter/Indicator	Farm Models			
	Improved sweet potato and banana production	Improved sweet potato and diversification to papaya	Improved sweet potato and diversification to cucumber	Improved sweet potato and diversification to lettuce
Key assets (production base)	500m2	500m2	500m2	500m2
Key investment/improvement	Transfer from open field with some irrigation to open field with drip fertigation system (investment in water tank collection, drip irrigation, photovoltaic system)	Transfer from open field with some irrigation to open field with hydroponic system (investment in water tank collection, drip and hydroponic systems, photovoltaic system)	Transfer from open field with some irrigation to green house with hydroponic system (investment in water tank collection, moveable plating trays and hydroponic irrigation system, photovoltaic systems, ventilation)	Transfer from open field with some irrigation to closed vertical system (investment in complete closed vertical hydroponic system (multistore, 25m2 translate to 100 m2 production area), in water tank collection, hydroponic irrigation system, photovoltaic systems, ventilation)
Productivity/production (WOP/WP)	2.7t of sw potato and 0.6t of banana/3.6t of potato and 1.6t of banana	2.7t of sw potato and 0.6t of banana/3.6t of potato and 4t of papaya	3.6t of sw potato and 0.3t of banana/4.8t of potato and 25.5t of cucumber	3.6t of sw potato and 0.3t of banana/4.8t of potato and 8.25t of cucumber
Total incremental investments (US\$)	12 025	14 965	32 320	27 680
of which:				
- Loan	4 810	5 986	12 928	11 072
- Beneficiary contribution	6 013	7 483	16 160	13 840
- Matching grant	1 203	1 497	3 232	2 768
Use of labour (WOP/WP), pd	66/100	66/104	78/352	78/322
Total number of direct beneficiaries	2 HH	2 HH	4 HH	4 HH
of whom:				
- On-farm hired labour/labourers	1 person	1 person	3 persons	3 persons
Return to labour, US\$/day	30.1	37.6	33.9	34.4
Incremental annual benefits at full development (US\$)	1 421	2 327	10 030	9 175
NPV (US\$)	3 819	10 667	76 056	71 331
IRR	11.8%	17.6%	45.0%	49.6%
B/C ratio	1.6	1.7	1.3	1.3
Switching values Benefits	-36%	-41%	-21%	-25%
Switching values Costs	57%	69%	27%	33%

Item	Sweet potato	Banana	Papaya	Cucumber	Lettuce
Returns to labour	469	501	875	540	554
Returns to HH labour	1 875	1 170	2 333	23 039	20 851
Discount rate	7%	7%	7%	7%	7%
NPV @ 0.07	14 948	4 360	38 672	1 112 267	984 043
IRR	13%	9%	16%	64%	73%
NPVb	323 923	202 147	303 221	7 942 332	5 995 682
NPVc	204 748	132 141	161 784	6 477 868	4 670 308
B/C ratio	1.6	1.5	1.9	1.2	1.3
Switching values Benefits	-37%	-35%	-47%	-18%	-22%
Switching values Costs	58%	53%	87%	23%	28%

Table 23: Staple production (sweet potato, WP open field with drip fertigation) - 100 m²

MAP-Fin Analysis.xlsx - Excel

A		B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1	Economic and Financial Analysis																							
2	Republic of Maldives								1US\$ = 15.35 MVR															
3	Maldives Agribusiness Programme (MAP)																							
4																								
5	Staple production (sweet potato, WP open field with drip fertigation) - 100 m ²																							
6	WP open field with supplementary irrigation																							
7		Unit	WOP	WP(full prod)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
8	Yield lb																							
9	1st grade	kg	630	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	
10	2nd grade	kg	270	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
11	Crop Inputs																							
12	Seed/Seedlings - local	kg	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	Seed/Seedlings - improved	kg	0	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
14	Chemical fertilizer	kg	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	Organic fertilizer	kg	0	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
16	Water Ph control	kg	0	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
17	Pesticide	lt	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	Bio pest control agent	lt	0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
19	Cow dung	kg	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
20	Bags	unit	18	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
21	Diesel for stand-by generator /c	lt	0	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
22	Electricity for pumping water /d	KWh	180	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680
23	Land lease	100m ²	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
24	Transportation /e	ton-km	90	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
25	Labour																							
26	Family labour	pd	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
27	Hired labour	pd	12	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
28	Total Labor	pd	18	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
29	Investment cost																							

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	
1	Economic and Financial Analysis																								
2	Republic of Maldives								1 US\$ = 15.35 MVR																
3	Maldives Agribusiness Programme (MAP)																								
4																									
5	Staple production (sweet potato, WP open field with drip fertigation) - 100 m²																								
6	WOP open field with supplementary irrigation				Unit	WOP	WP (full prod)		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
7																									
29	Investment cost																								
30	Drip system	MVR/100m ²							1842.00	1842.00															
31	Drip distribution system	MVR/100m ²							921.00	921.00															
32	and water storage (40m ³ for use by other crops too)	MVR/100m ²							15350.00	15350.00															
33	Rainwater Polythene collection sheet (100m ²)	MVR/100m ²							1458.25	1458.25															
34	Storage tank 150m ³	MVR/100m ²							7675.00	7675.00															
35	Photovoltaic system of 1.5 KWh with battery back for 12 hours/day	MVR/100m ²							5833.00	5833.00															
36	Standby generator of 2KWh	MVR/100m ²							1228.00	1228.00															
37	Borehole and water pump 3-4 meter	MVR/100m ²	2609.50	2609.50																					
38	Water pump (1,500 watt)	MVR/100m ²	2072.25						0.00																
39																									
40	Input/output prices																								
41	1st grade	MVR/kg	21	26	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00		
42	2nd grade	MVR/kg	17	21	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	
43	Seed/Seedlings - local	MVR/kg	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	
44	Seed/Seedlings - improved	MVR/kg	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	
45	Chemical fertilizer	MVR/kg	22	22	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	
46	Organic fertilizer	MVR/kg	4	4	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	
47	Water Ph control	MVR/kg	77	77	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	
48	Pesticide	MVR/lit	384	384	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	
49	Bio pest control agent	MVR/lit	844	844	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	
50	Cow dung	MVR/kg	2	2	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	
51	Bags	MVR/each	2	2	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	
52	Diesel for stand-by generator/lc	MVR/lit	11	11	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	
53	Electricity for pumping water /d	MVR/kWh	6	6	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	
54	Land lease	MVR/100m ²	10	10	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	
55	Transportation /e	MVR/ton-km	2.6	2.6	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	
56	Hired labour	MVR/pd	729	729	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	
57																									
58	Gross output																								
59	1st grade	MVR/100m ²	13 104	28 080	28 080	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####
60	2nd grade	MVR/100m ²	4 493	2 496	2 496	2 496	2 496	2 496	2 496	2 496	2 496	2 496	2 496	2 496	2 496	2 496	2 496	2 496	2 496	2 496	2 496	2 496	2 496	2 496	
61	Sub-total MVR/100m²		17 597	30 576	30 576	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X			
1	Economic and Financial Analysis																										
2	Republic of Maldives								1US\$ = 15.35 MVR																		
3	Maldives Agribusiness Programme (MAP)																										
4																											
5	Staple production (sweet potato, WP open field with drip fertigation) - 100 m2																										
6	WOP open field with supplementary irrigation																										
7																											
62	Investment Costs																										
63	Drip system				MVR/100m2	0		1842		1842																	
64	Drip distribution system				MVR/100m2	0		921		921																	
65	Water collection from dug in drainage cells, and water storage (40m3 for use by other crops too)				MVR/100m2	0		15350		15350																	
66	Rainwater Polythene collection sheet (100m2)				MVR/100m2	0		1458		1458																	
67	Storage tank 150m3				MVR/100m2	0		7675		7675																	
68	Photovoltaic system of 1.5 KWh with battery back for 12 hours/day				MVR/100m2	0		5833		5833																	
69	Standby generator of 2KWh				MVR/100m2	0		1228		1228																	
70	Borehole and water pump 3-4 meter				MVR/100m2	261		2610		2610																	
71	Water pump (1,500 watt)				MVR/100m2	207		0		0																	
72	Sub-total	MVR/100m2	468		36 917	36 917		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
73	Recurrent Costs																										
74	Seed/Seedlings - local				MVR/100m2	4.96		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
75	Seed/Seedlings - improved				MVR/100m2	0		6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6			
76	Chemical fertilizer				MVR/100m2	396		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
77	Organic fertilizer				MVR/100m2	0		92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92			
78	Water Ph control				MVR/100m2	0		537	537	537	537	537	537	537	537	537	537	537	537	537	537	537	537	537			
79	Pesticide				MVR/100m2	38		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
80	Bio pest control agent				MVR/100m2	0		591	591	591	591	591	591	591	591	591	591	591	591	591	591	591	591	591			
81	Cow dung				MVR/100m2	0		201	201	201	201	201	201	201	201	201	201	201	201	201	201	201	201	201			
82					Unit	WOP	wP (full prod)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
83	Bags				MVR/100m2	36		48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	
84	Diesel for stand-by generator 1c				MVR/100m2	0		328	328	328	328	328	328	328	328	328	328	328	328	328	328	328	328	328	328	328	
85	Electricity for pumping water 1d				MVR/100m2	1080		4080	4080	4080	4080	4080	4080	4080	4080	4080	4080	4080	4080	4080	4080	4080	4080	4080	4080		
86	Land lease				MVR/100m2	10		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
87	Transportation 1e				MVR/100m2	234		312	312	312	312	312	312	312	312	312	312	312	312	312	312	312	312	312	312		
88	Hired labour				MVR/100m2	8747		13121	13121	13121	13121	13121	13121	13121	13121	13121	13121	13121	13121	13121	13121	13121	13121	13121	13121		
89	Sub-total	MVR/100m2	8888	19 327	19 327	19 327	19 327	19 327	19 327	19 327	19 327	19 327	19 327	19 327	19 327	19 327	19 327	19 327	19 327	19 327	19 327	19 327	19 327				
90	Gross Margin	MVR/100m2	6 582	(25 668)	8888	11 243	11 243	11 243	11 243	11 243	11 243	11 243	11 243	11 243	11 243	11 243	11 243	11 243	11 243	11 243	11 243	11 243	11 243	11 243			
91	Returns to Family Labor				MVR/pd	1097		(4 278)	(4 278)	1875	1875	1875	1875	1875	1875	1875	1875	1875	1875	1875	1875	1875	1875	1875	1875		
92	Incremental net income																										
93	Benefit/Costs Ratio																										
94	Returns to labour																										
95	Returns to HH labour																										
96	Discount rate																										
97	NPV @ 0.07																										
98	IRR																										
99	NPVb																										
100	NPVc																										
101	B/C ratio																										
102	Switching values Benefits																										
103	Switching values Costs																										
104	Is WOP-without project, WP-with project at full production																										
105	Is 3 cycles per annum, 4kg/m2 for WP and 3kg/m2 for WOP; 30% and 70% for the 1st grads in WP and WOP respectively																										
106	Is For WP - 60 days @ 0.5lt per day.																										
107	Is For WP: 500w per hour, 4 hours per day, for 340 days; for WOP: 3Kwh for 60 days per year.																										
108	Is 100km on average																										

Table 24: Banana production (WP open field with drip fertigation system) - 100 m²

MAP-Fin Analysis.xlsx - Excel

The table below provides a detailed breakdown of banana production costs per 100 m² under a WP open field with supplementary irrigation system.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	
1	Economic and Financial Analysis																						
2	Republic of Maldives		1 US\$ = 15.35 MVR																				
3	Maldives Agribusiness Programme (MAP)																						
4	Banana production (WP open field with drip fertigation system) - 100 m ²																						
5	WOP open field with supplementary irrigation		Unit	WOP	WP (full prod)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
6	WITH PROJECT 100 m ²																						
7	Yield /b																						
8	1st grade	kg	210	720	504	720	720	720	720	720	720	720	720	720	720	720	720	720	720	720	720	720	
9	2nd grade	kg	90	80	56	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	
10	Crop Inputs																						
11	Seed/Seedlings - local	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
12	Seed/Seedlings - improved (1.8mX2m)	kg	0	28	28	0	0	0	0	28	0	0	0	0	0	0	0	0	0	0	0	0	
13	Chemical fertilizer	kg	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
14	Organic fertilizer	kg	0	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
15	Water Ph control	kg	0	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	
16	Pesticide	lt	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
17	Bio pest control agent	lt	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
18	Cow dung	kg	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
19	Carton box	unit	43	114	80	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	
20	Diesel for stand-by generator /c	lt	0	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
21	Electricity for pumping water /d	KWh	180	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680	
22	Land lease	100m ²	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
23	Transportation /e	ton-km	30	80	56	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	
24	Labour																						
25	Family labour	pd	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6		
26	Hired labour	pd	0	8	6	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8		
27	Total Labor	pd	6	14	12	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14		
28	Investment cost																						
29	Drip system	MVR/100m ²		1842.00		1842																	
30	Drip distribution system	MVR/100m ²		921.00		921																	
31	Water collection from dug in drainage cells, and water storage (40m ³ for use by other crops too)	MVR/100m ²		15350.00		15350																	
32	Rainwater Polythene collection sheet (100m ²)	MVR/100m ²		1458.25		1458.25																	
33	Storage tank 150m ³ (plus other crops)	MVR/100m ²		7675.00		7675																	
34	Photovoltaic system of 1.5 KWH with battery back for 12 hours/day	MVR/100m ²		5833.00		5833																	
35	Standby generator of 2KWH	MVR/100m ²		1228.00		1228																	
36	Borehole and water pump 3-4 meter	MVR/100m ²	2609.50	2609.50	2609.5																		
37	Water pump (1,500 watt)	MVR/100m ²	2072.25		0																		

A	B	C	D	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1 Economic and Financial Analysis																						
2 Republic of Maldives																						
3 Maldives Agribusiness Programme (MAP)																						
4 Banana production (WP open field with drip fertigation) - 100 m2																						
5 WOP open field with supplementary irrigation																						
6																						
40 Input/output prices																						
41 1st grade	MVR/kg	18	25	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	
42 2nd grade	MVR/kg	14	20	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	
43 Seed/Seedlings - local	MVR/kg	4	4	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	
44 Seed/Seedlings - improved (1.8mX2m)	MVR/kg	6	6	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	
45 Chemical fertilizer	MVR/kg	22	22	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	
46 Organic fertilizer	MVR/kg	4	4	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	
47 Water Ph control	MVR/kg	77	77	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	
48 Pesticide	MVR/t	384	384	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	
49 Bio pest control agent	MVR/t	844	844	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	
50 Cow dung	MVR/kg	2	2	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	
51 Carton box	MVR/each	3	3	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	
52 Diesel for stand-by generator /l	MVR/l	11	11	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	
53 Electricity for pumping water /l	MVR/KWh	6	6	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	
54 Land lease	MVR/100m2	10	10	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	
55 Transportation /t	MVR/ton-km	4.6	4.6	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	
56 Hired labour	MVR/pd	729	729	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	
57																						
58 Gross output																						
59 1st grade	MVR/100m2	3675	18 000	18 000	18 000	18 000	18 000	18 000	18 000	18 000	18 000	18 000	18 000	18 000	18 000	18 000	18 000	18 000	18 000	18 000	18 000	
60 2nd grade	MVR/100m2	1260	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
61 Sub-total	MVR/100m2	4 935	19 600	19 600	19 600	19 600	19 600	19 600	19 600	19 600	19 600	19 600	19 600	19 600	19 600	19 600	19 600	19 600	19 600	19 600	19 600	
62 Investment Costs																						
63 Drip system	MVR/100m2	0	1842																			
64 Drip distribution system	MVR/100m2	0	921																			
65 Water collection from dug in drainage cells, and water storage (40m3 for use by other crops too)	MVR/100m2	0	15350																			
66 Rainwater Polythene collection sheet (100m2)	MVR/100m2	0	1458																			
67 Storage tank 150m3 (plus other crops)	MVR/100m2	0	7675																			
68 Photovoltaic system of 1.5 KWH with battery back for 12 hours/day	MVR/100m2	0	5833																			
69 Standby generator of 2KWH	MVR/100m2	0	1228																			
70 Borehole and water pump 3-4 meter	MVR/100m2	261	2610																			
71 Water pump (1,500 watt)	MVR/100m2	207	0																			
72 Sub-total	MVR/100m2	468	36 917	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 25: Papaya production (WP greenhouse with hydroponic system) - 100 m²

MAP-Fin Analysis.xlsx - Excel

The screenshot shows a Microsoft Excel spreadsheet titled "MAP-Fin Analysis.xlsx". The main content is organized into several sections:

- Economic and Financial Analysis:** Includes rows for the Republic of Maldives and the Maldives Agribusiness Programme (MAP). A conversion rate of "1US\$ = 15.35 MVR" is noted.
- Papaya production (WP open field with hydroponic system) - 100 m²:** This section contains detailed data for various inputs and costs. It includes a header "WITH PROJECT 100 m²" and lists items such as Yield /b, Crop Inputs (e.g., Seed/Seedlings - local, Chemical fertilizer), and Labour (e.g., Family labour, Hired labour).
- Investment cost:** A row for "Drip system" is listed under this category.

The spreadsheet uses a standard grid layout with columns labeled A through X and rows numbered 1 through 30. The "Home" tab is selected in the ribbon, and the formula bar at the top shows the current cell is E101 and the formula is "=NPV(E100,E95:X95)".

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1	Economic and Financial Analysis																							
2	Republic of Maldives																							
3	Maldives Agribusiness Programme (MAP)																							
4																								
5	Papaya production (WP open field with hydroponic system) - 100 m2																							
6	WOP open field with supplementary irrigation																							
7		Unit	WOP	WP (full prod)		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
29	Investment cost																							
30	Drip system	MVR/100m2			1842.00	1842																		
31	Hydroponic delivery system	MVR/100m2			10131.00	10131																		
32	Water collection from dug in drainage cells, and water storage (40m3 for use by other crops too)	MVR/100m2	276.3	15350.00	15350																			
33	Rainwater Polythene collection sheet (100m2)	MVR/100m2	383.75	1458.25	1458.25																			
34	Storage tank 150m3 (plus other crops)	MVR/100m2	1535	7675.00	7675																			
35	Photovoltaic system of 1.5 KWh with battery back for 12 hours/day	MVR/100m2		5833.00	5833																			
36	Standby generator of 2KwH	MVR/100m2		1228.00	1228																			
37	Borehole and water pump 3-4 meter	MVR/100m2	260.95	2609.50	2609.5																			
38	Water pump (1,500 watt)	MVR/100m2	207.23	0																				
39	Bird/insect net	MVR/100m2	184.20	1842.00	1842.0																			
40	Water cooling unit (750 watt capacity, to be used by other crops)	MVR/100m2		11512.50	11512.5																			
41																								
42	Input/output prices																							
43	1st grade	MVR/kg	11	15	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.0	
44	2nd grade	MVR/kg	8	12	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.0	
45	Seed/Seedlings - local	MVR/kg	3	3	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.8	
46	Seed/Seedlings - improved (1.5mX1.5m)	MVR/kg	5	5	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.7	
47	Chemical fertilizer	MVR/kg	22	22	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.0	
7		Unit	WOP	WP (full prod)		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
42	Input/output prices																							
43	1st grade	MVR/kg	11	15	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.0	
44	2nd grade	MVR/kg	8	12	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.0	
45	Seed/Seedlings - local	MVR/kg	3	3	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.8	
46	Seed/Seedlings - improved (1.5mX1.5m)	MVR/kg	5	5	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.7	
47	Chemical fertilizer	MVR/kg	22	22	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.0	
48	Organic fertilizer	MVR/kg	4	4	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.8	
49	Water Ph control	MVR/kg	77	77	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.7	
50	Pesticide	MVR/lit	384	384	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.7	
51	Bio pest control agent	MVR/lit	844	844	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.2	
52	Cow dung	MVR/kg	2	2	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.0	
53	Carton box	MVR/each	3	3	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.0	
54	Diesel for stand-by generator /l	MVR/lit	11	11	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.9	
55	Electricity for pumping and cooling water /l	MVR/kWh	6	6	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.0	
56	Land lease	MVR/100m2	10	10	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.0	
57	Transportation /t	MVR/ton-km	4.6	4.6	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.6	
58	Hired labour	MVR/pd	729	729	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.9	
59																								
60	Gross output																							
61	1st grade	MVR/100m2	5513	27000	18 900	27000	27000	27000	27000	27000	27000	27000	27000	27000	27000	27000	27000	27000	27000	27000	27000	27000	27000	
62	2nd grade	MVR/100m2	1890	2400	1680	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	
63	Sub-total MVR/100m2		7403	29 400	20 580	29 400	29 400	29 400	29 400	29 400	29 400	29 400	29 400	29 400	29 400	29 400	29 400	29 400	29 400	29 400	29 400	29 400		

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	
1 Economic and Financial Analysis																						
2 Republic of Maldives																						
3 Maldives Agribusiness Programme (MAP)																						
4																						
5 Papaya production (WP open field with hydroponic system) - 100 m2																						
6 WOP open field with supplementary irrigation																						
7				Unit	WOP	WP (full prod)		1	2	3	4	5	6	7	8	9	10	11	12	13	14	
64 Investment Costs																						
65 Drip system				MVR/100m2	0	1842	1842															
66 Hydroponic delivery system				MVR/100m2	0	10131	10131															
67 Water collection from dug in drainage cells, and water storage (40m3 for use by other crops too)				MVR/100m2	276	15350	15350															
68 Rainwater Polythene collection sheet (100m2)				MVR/100m2	384	1458	1458															
69 Storage tank 150m3 (plus other crops)				MVR/100m2	154	7675	7675															
70 Photovoltaic system of 1.5 KWH with battery back for 12 hours/day				MVR/100m2	0	5833	5833															
71 Standby generator of 2KWH				MVR/100m2	0	1228	1228															
72 Borhole and water pump 3-4 meter				MVR/100m2	26	2610	2610															
73 Water pump (1,500 watt)				MVR/100m2	21	0	0															
74 Bird/insect net				MVR/100m2	184	1842	1842															
75 Water cooling unit (750 watt capacity, to be used by other crops)				MVR/100m2	0	11513	11513															
76 Sub-total				MVR/100m2	1 045	59 481	59 481	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
77 Recurrent Costs																						
78 Seed/Seedlings - local				MVR/100m2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
79 Seed/Seedlings - improved (1.5mX1.5m)				MVR/100m2	0	200	200	0	0	0	0	200	0	0	0	0	200	0	0	0	0	
80 Chemical fertilizer				MVR/100m2	110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
77 Recurrent Costs																						
78 Seed/Seedlings - local				MVR/100m2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
79 Seed/Seedlings - improved (1.5mX1.5m)				MVR/100m2	0	200	200	0	0	0	0	200	0	0	0	0	0	0	0	200	0	
80 Chemical fertilizer				MVR/100m2	110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
81 Organic fertilizer				MVR/100m2	0	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334	
82 Water Ph control				MVR/100m2	0	537	537	537	537	537	537	537	537	537	537	537	537	537	537	537	537	537
83 Pesticide				MVR/100m2	38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
84 Bio pest control agent				MVR/100m2	0	844	844	844	844	844	844	844	844	844	844	844	844	844	844	844	844	844
85 Cow dung				MVR/100m2	0	201	201	201	201	201	201	201	201	201	201	201	201	201	201	201	201	201
86 Carton box				MVR/100m2	321	857	600	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857
87 Diesel for stand-by generator /c				MVR/100m2	0	328	328	328	328	328	328	328	328	328	328	328	328	328	328	328	328	328
88 Electricity for pumping and cooling water /d				MVR/100m2	1080	4080	4080	4080	4080	4080	4080	4080	4080	4080	4080	4080	4080	4080	4080	4080	4080	4080
89 Land lease				MVR/100m2	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
90 Transportation /e				MVR/100m2	345	920	644	920	920	920	920	920	920	920	920	920	920	920	920	920	920	920
91 Hired labour				MVR/100m2	0	7289	5832	7289	7289	7289	7289	7289	7289	7289	7289	7289	7289	7289	7289	7289	7289	7289
92 Sub-total				MVR/100m2	1 905	15 601	13 610	15 401	15 401	15 401	15 601	15 401	15 401	15 401	15 401	15 401	15 401	15 401	15 401	15 401	15 401	15
93 Gross Margin				MVR/100m2	4 453	(45 682)	(52 511)	13 999	13 999	13 999	13 999	13 999	13 999	13 999	13 999	13 999	13 999	13 999	13 999	13 999	13 999	13
94 Returns to Family Labor				MVR/pd	742	(7 614)	(8 752)	2 333	2 333	2 333	2 333	2 300	2 333	2 333	2 333	2 300	2 333	2 333	2 333	2 300	2 333	2 333
95 Incremental net income						(56 964)	9 546	9 546	9 546	9 546	9 346	9 546	9 546	9 546	9 546	9 346	9 546	9 546	9 546	9 346	9 546	9 546
96 Benefit/Costs Ratio						3.9	1.9	1.5	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1 Economic and Financial Analysis																
2 Republic of Maldives							1 US\$ = 15.35 MVR									
3 Maldives Agribusiness Programme (MAP)																
4																
5 Papaya production (WP open field with hydroponic system) - 100 m ²																
6 WOP open field with supplementary irrigation																WITH PROJECT 100 m ²
7	Unit	WOP	WP (full prod)	1	2	3	4	5	6	7	8	9	10	11	12	
96 Benefit/Costs Ratio		3.9	1.9	1.5	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	
97				Returns to labour	875											
98				Returns to HH labour	2 333											
99				Discount rate	7.0%											
100				NPV @ 0.07	38 672											
101				IRR	15.7%											
102				NPV _b	303 221											
103				NPV _c	161 784											
104				B/C ratio	1.87											
105				Switching values Benefits	-47%											
106				Switching values Costs	87%											
107																
108																
109	a WOP-without project, WP-with project at full production															
110	b 20kg/m ² for WP and 7.5kg/m ² for WOP; 90% and 70% for the 1st grade in WP and WOP respectively															
111	c For WP - 60 days @ 0.5lt per day.															
112	d For WP: 500W per hour, 4 hours per day, for 340 days; for WOP: 3KWh for 60 days per year.															
113	e 100km on average															
114																
115																
116																
	CF	SER	Prices	Summary	SwPotato	Banana	Papaya	Cucumber	Lettuce	FM Sv ...						
Ready																
	Windows	Search	File	Microsoft Edge	File Explorer	OneDrive	OneNote	Word	Excel	PowerPoint	Outlook	OneDrive	OneNote	Word	Excel	

Table 26: Cucumber production (WP greenhouse with hydroponic system) - 100 m²

MAP-Fin Analysis.xlsx - Excel

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Cut Copy Arial 8 A A Wrap Text Custom Conditional Format as Table Cell Styles Insert Delete Format Cells AutoSum Fill Sort & Find & Filter Clear Select Editing

E108 : X ✓ fx =NPV(E107,E102:X102)

A B C D F G H I J K L M N O P Q R S T U V W X

1 Economic and Financial Analysis
 2 Republic of Maldives
 3 Maldives Agribusiness Programme (MAP)
 4
 5 Cucumber production (WP green house with hydroponic system) - 100 m²
 6 WOP open field with supplementary irrigation
 7 WITH PROJECT 100 m²
 8 Yield lb
 9 1st grade kg 2100 22950
 10 2nd grade kg 900 2550
 11 Crop Inputs
 12 Seed/Seedlings - local kg 6500
 13 Seed/Seedlings - improved kg 0 65000
 14 Chemical fertilizer kg 42 0
 15 Organic fertilizer kg 0 260
 16 Water Ph control kg 0 260
 17 Detergent lt 0 40
 18 Pesticide lt 0.3 0
 19 Bio pest control agent lt 0 11
 20 Cow dung kg 0 300
 21 Plastic crate unit 200 1700
 22 Diesel for stand-by generator/lc lt 0 720
 23 Electricity for pumping and cooling water/l d Kwh 180 10200
 24 Land lease 100m² 1
 25 Transportation/l e ton-km 300 2550
 26 Labour
 27 Family labour pd 6
 28 Hired labour pd 40 250
 29 Total Labor pd 46 256

	A	B	C	D	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1	Economic and Financial Analysis																						
2	Republic of Maldives																						
3	Maldives Agribusiness Programme (MAP)																						
4																							
5	Cucumber production (WP green house with hydroponic system) - 100 m ²																						
6	WOP open field with supplementary irrigation	Unit	WOP	WP (full prod)																			
7																							
30	Investment cost																						
31	Natural, plus forced ventilation 100 m ² plus 10 m ² packaging	MVR/100m ²			84425.00																		
32	Moveable planting trays and hydroponic irrigation system	MVR/100m ²			73680.00																		
33	Foundation, concrete tiles, toilet and bath facilities	MVR/100m ²			61400.00																		
34	Water collection from dug in drainage cells (40m ³ dug into the soil)	MVR/100m ²			46050.00																		
35	Collection from greenhouse roof	MVR/100m ²			1918.75																		
36	Ventilation	MVR/100m ²			7675.00																		
37	Storage tank 200m ³ (plus other crops)	MVR/100m ²	2302.5		23025.00																		
38	Photovoltaic system of 9 KWh with battery back for 12 hours/day	MVR/100m ²			21490.00																		
39	Standby generator of 7KWh	MVR/100m ²			11512.50																		
40	Borhole and water pump 3-4 meter	MVR/100m ²	260.95																				
41	Water pump (1,500 watt)	MVR/100m ²	207.23																				
42	Shade net	MVR/100m ²	4605.00																				
43	Water cooling unit	MVR/100m ²			26862.50																		
44	Input/output prices																						
45	1st grade	MVR/kg	21		30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	
46	2nd grade	MVR/kg	17		24	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00
47	Seed/Seedlings - local	MVR/kg	3		3	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86
48	Seed/Seedlings - improved	MVR/kg	5		5	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76
49	Chemical fertilizer	MVR/kg	22		22	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02
50	Organic fertilizer	MVR/kg	4		3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84
51	Water Ph control	MVR/kg	77		77	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75
52	Detergent	MVR/lit	77		77	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75	76.75
53	Pesticide	MVR/lit	384		384	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75	383.75
54	Bio pest control agent	MVR/lit	844		844	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25	844.25
55	Cow dung	MVR/kg	2		2	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01
56	Plastic crate	MVR/each	3		3	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
57	Diesel for stand-by generator /c	MVR/lit	11		11	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94
58	Electricity for pumping and cooling water /d	MVR/Kwh	6		6	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
59	Landlease	MVR/100m ²	10		10	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
60	Transportation /e	MVR/ton-km	4.6		4.6	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60
61	Hiredlabour	MVR/pd	729		729	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95	728.95
62																							

	A	B	C	D	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	
1	Economic and Financial Analysis																							
2	Republic of Maldives																							
3	Maldives Agribusiness Programme (MAP)																							
4																								
5	Cucumber production (WP green house with hydroponic system) - 100 m2																							
6	WOP open field with supplementary irrigation																							
7		Unit	WOP	WP (full prod)	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
63																								
64	Gross output																							
65	1st grade	MVR/100m2	44 100	688 500	688 500	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	
66	2nd grade	MVR/100m2	15 120	61200	61200	61200	61200	61200	61200	61200	61200	61200	61200	61200	61200	61200	61200	61200	61200	61200	61200	61200		
67	Sub-total MVR/100m2		59 220	749 700	749 700	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	
68	Investment Costs																							
69	Natural, plus forced ventilation 100 m2 plus 10 m2 packaging	MVR/100m2	0	84425																				
70	Moveable planting trays and hydroponic irrigation system	MVR/100m2	0	73680																				
71	Foundation, concrete tiles, toilet and bath facilities	MVR/100m2	0	61400																				
72	Water collection from dug in drainage cells (40m3 dug into the soil)	MVR/100m2	0	46050																				
73	Collection from greenhouse roof	MVR/100m2																						
74	Ventilation	MVR/100m2																						
75	Storage tank 200m3 (plus other crops)	MVR/100m2	230	23025																				
76	Photovoltaic system of 9 kWh with battery back for 12 hours/day	MVR/100m2	0	21490																				
77	Standby generator of 7kWh	MVR/100m2	0	11513																				
78	Borhole and water pump 3-4 meter	MVR/100m2	26	0																				
79	Water pump (1,500 watt)	MVR/100m2	21	0																				
80	Shade net	MVR/100m2	4605	0																				
81	Water cooling unit	MVR/100m2	0	26863																				
82	Sub-total MVR/100m2		4 882	348 445	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
83	Recurrent Costs																							
84	Seed/Seedlings - local	MVR/100m2	18564	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
85	Seed/Seedlings - improved	MVR/100m2	0	309400	309400	309400	309400	309400	309400	309400	309400	309400	309400	309400	309400	309400	309400	309400	309400	309400	309400	309400		
86	Chemical fertilizer	MVR/100m2	925	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
87	Organic fertilizer	MVR/100m2	0	998	998	998	998	998	998	998	998	998	998	998	998	998	998	998	998	998	998	998	998	
88	Water Ph control	MVR/100m2	0	19955	19955	19955	19955	19955	19955	19955	19955	19955	19955	19955	19955	19955	19955	19955	19955	19955	19955	19955	19955	
89	Detergent	MVR/100m2	0	3070	3070	3070	3070	3070	3070	3070	3070	3070	3070	3070	3070	3070	3070	3070	3070	3070	3070	3070	3070	
90	Pesticide	MVR/100m2	115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
91	Bio pest control agent	MVR/100m2	0	9287	9287	9287	9287	9287	9287	9287	9287	9287	9287	9287	9287	9287	9287	9287	9287	9287	9287	9287	9287	
92	Cow dung	MVR/100m2	0	603	603	603	603	603	603	603	603	603	603	603	603	603	603	603	603	603	603	603	603	
93	Plastic crate	MVR/100m2	600	5100	5100	5100	5100	5100	5100	5100	5100	5100	5100	5100	5100	5100	5100	5100	5100	5100	5100	5100	5100	
94	Diesel for stand-by generator /c	MVR/100m2	0	7874	7874	7874	7874	7874	7874	7874	7874	7874	7874	7874	7874	7874	7874	7874	7874	7874	7874	7874	7874	
95	Electricity for pumping and cooling water /d	MVR/100m2	1080	61200	61200	61200	61200	61200	61200	61200	61200	61200	61200	61200	61200	61200	61200	61200	61200	61200	61200	61200		
96	Land lease	MVR/100m2	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
97	Transportation /e	MVR/100m2	1380	11730	11730	11730	11730	11730	11730	11730	11730	11730	11730	11730	11730	11730	11730	11730	11730	11730	11730	11730	11730	
98	Hired labour	MVR/100m2	29158	182237	182237	182237	182237	182237	182237	182237	182237	182237	182237	182237	182237	182237	182237	182237	182237	182237	182237	182237	182237	
99	Sub-total MVR/100m2		*****	611465	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	
100	Gross Margin	MVR/100m2	2 506	(210 210)	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
101	Returns to Family Labor	MVR/pd	418	(35 035)	23 039	23 039	23 039	23 039	23 039	23 039	23 039	23 039	23 039	23 039	23 039	23 039	23 039	23 039	23 039	23 039	23 039	23 039	23 039	
102	Incremental net income				*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1 Economic and Financial Analysis																			
2 Republic of Maldives							1 US\$ =	15.35 MVR											
3 Maldives Agribusiness Programme (MAP)																			
4																			
5 Cucumber production (WP green house with hydroponic system) - 100 m2																			
6 WOP open field with supplementary irrigation																			
7	Unit	WOP	WP (full prod)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
102 Incremental net income				(212 716)	135 729	135 729	135 729	135 729	135 729	135 729	135 729	135 729	135 729	135 729	135 729	135 729	135 729	135 729	
103 Benefit/Costs Ratio				1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
104				Returns to labour	540														
105				Returns to HH labour	23 039														
106				Discount rate	7.0%														
107				NPV @ 0.07	1 112 267														
108				IRR	63.8%														
109				NPVb	7 942 332														
110				NPVc	6 477 868														
111				B/C ratio	1.23														
112				Switching values Benefits	-18%														
113				Switching values Costs	23%														
114																			
115																			
116	a WOP-without project, WP-with project at full production																		
117	b 30kg/m2/cycle, 8.5 cycles for WP and 6kg/m2/cycle, 5 cycles for WOP; 90% and 70% for the 1st grade in WP and WOP respectively																		
118	c For WP - 60 days, 24 hours @ 0.5lt per hour.																		
119	d For WP: 1250W per hour, 24 hours per day, for 340 days; for WOP: 3KWh for 60 days per year.																		
120	e 100km on average																		
121																			

Table 27: Lettuce production (WP closed vertical with hydroponic system) - 100 m²

MAP-Fin Analysis.xlsx - Excel

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A31 Complete closed vertical hydroponic system (25m² translate to 100 m² production area) plus 10 m² packaging

A		B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1	Economic and Financial Analysis																							
2	Republic of Maldives																							
3	Maldives Agribusiness Programme (MAP)																							
4																								
5	Lettuce production (WP closed vertical with hydroponic system) - 100 m²																							
6	WOP open field with supplementary irrigation	Unit	WOP	WP (full prod)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
7																								
11	Crop Inputs																							
12	Seed/Seedlings - local	kg	17400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	Seed/Seedlings - improved	kg	0	174000	174000	174000	174000	174000	174000	174000	174000	174000	174000	174000	174000	174000	174000	174000	174000	174000	174000	174000	174000	
14	Chemical fertilizer	kg	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	Organic fertilizer	kg	0	294	294	294	294	294	294	294	294	294	294	294	294	294	294	294	294	294	294	294	294	294
16	Water Ph control	kg	0	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87
17	Detergent	lt	0	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
18	Pesticide	lt	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	Bio pest control agent	lt	0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
20	Cow dung	kg	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
21	Packing bag (0.5 kg)	unit	1800	16500	16500	16500	16500	16500	16500	16500	16500	16500	16500	16500	16500	16500	16500	16500	16500	16500	16500	16500	16500	
22	Diesel for stand-by generator /c	lt	0	720	720	720	720	720	720	720	720	720	720	720	720	720	720	720	720	720	720	720	720	720
23	Electricity for pumping and cooling water /d	Kwh	180	21216	21216	21216	21216	21216	21216	21216	21216	21216	21216	21216	21216	21216	21216	21216	21216	21216	21216	21216	21216	
24	Land lease	100m ²	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
25	Transportation /e	ton-km	90	825	825	825	825	825	825	825	825	825	825	825	825	825	825	825	825	825	825	825	825	825
26	Labour																							
27	Family labour	pd	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
28	Hired labour	pd	25	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220
29	Total Labor	pd	31	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226
30	Investment cost																							
31	Complete closed vertical hydroponic system (25m ² translate to 100 m ² production area) plus 10 m ² packaging	MVR/100m ²		114357.50	114357.5																			
32	Foundation, concrete tiles, toilet and bath facilities	MVR/100m ²		50655.00	50655																			

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1 Economic and Financial Analysis																				
2 Republic of Maldives						1 US\$ = 15.35 MVR														
3 Maldives Agribusiness Programme (MAP)																				
4																				
5 Lettuce production (WP closed vertical with hydroponic system) - 100 m2																				
6 WOP open field with supplementary irrigation		Unit	WOP	WP (full prod)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
74 Borhole and water pump 3-4 meter	MVR/100m2	26	0	0																1
75 Water pump (1,500 watt)	MVR/100m2	21	0	0																
76 Shade net	MVR/100m2	3070	0	0																
77 Water cooling units	MVR/100m2	0	4145	4145																
78 Sub-total	MVR/100m2	3 194	277 221	277 221	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
79 Recurrent Costs																				
80 Seed/Seedlings - local	MVR/100m2	4802.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 Seed/Seedlings - improved	MVR/100m2	0	80040	80040	80040	80040	80040	80040	80040	80040	80040	80040	80040	80040	80040	80040	80040	80040	80040	
82 Chemical fertilizer	MVR/100m2	528	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
83 Organic fertilizer	MVR/100m2	0	1129	1129	1129	1129	1129	1129	1129	1129	1129	1129	1129	1129	1129	1129	1129	1129	1129	
84 Water Ph control	MVR/100m2	0	6677	6677	6677	6677	6677	6677	6677	6677	6677	6677	6677	6677	6677	6677	6677	6677	6677	
85 Detergent	MVR/100m2	0	998	998	998	998	998	998	998	998	998	998	998	998	998	998	998	998	998	
86 Pesticide	MVR/100m2	38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
87 Bio pest control agent	MVR/100m2	0	2955	2955	2955	2955	2955	2955	2955	2955	2955	2955	2955	2955	2955	2955	2955	2955	2955	
88 Cow dung	MVR/100m2	0	201	201	201	201	201	201	201	201	201	201	201	201	201	201	201	201	20	
89 Packing bag (0.5 kg)	MVR/100m2	5400	49500	49500	49500	49500	49500	49500	49500	49500	49500	49500	49500	49500	49500	49500	49500	49500	4950	
90 Diesel for stand-by generator /c	MVR/100m2	0	7874	7874	7874	7874	7874	7874	7874	7874	7874	7874	7874	7874	7874	7874	7874	7874	787	
91 Electricity for pumping and cooling water /d	MVR/100m2	1080	127296	127296	127296	127296	127296	127296	127296	127296	127296	127296	127296	127296	127296	127296	127296	127296	12729	
92 Land lease	MVR/100m2	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	1	
93 Transportation /e	MVR/100m2	414	3795	3795	3795	3795	3795	3795	3795	3795	3795	3795	3795	3795	3795	3795	3795	3795	379	
94 Hired labour	MVR/100m2	18224	160369	160369	160369	160369	160369	160369	160369	160369	160369	160369	160369	160369	160369	160369	160369	160369	16036	

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1	Economic and Financial Analysis																				
2	Republic of Maldives																				
3	Maldives Agribusiness Programme (MAP)																				
4	Lettuce production (WP closed vertical with hydroponic system) - 100 m2																				
5	WOP open field with supplementary irrigation																				
6		Unit	WOP	WP (full prod)		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
94	Sub-total	MVR/100m2	30 497	440 844	440 844	440 844	440 844	440 844	440 844	440 844	440 844	440 844	440 844	440 844	440 844	440 844	440 844	440 844	440 844	440 844	
95	Gross Margin	MVR/100m2	7 763	(152 115)	(152 115)	125 106	125 106	125 106	125 106	125 106	125 106	125 106	125 106	125 106	125 106	125 106	125 106	125 106	125 106	125 106	125 106
96	Returns to Family Labor	MVR/pd	1 294	(25 353)	(25 353)	20 851	20 851	20 851	20 851	20 851	20 851	20 851	20 851	20 851	20 851	20 851	20 851	20 851	20 851	20 851	20 851
97	Incremental net income				(159 878)	117 343	117 343	117 343	117 343	117 343	117 343	117 343	117 343	117 343	117 343	117 343	117 343	117 343	117 343	117 343	117 343
98	Benefit/Costs Ratio				1.4	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.
99		Returns to labour				554															
100		Returns to HH labour				20 851															
101		Discount rate				7.0%															
102		NPV @ 0.07				984 043															
103		IRR				73.4%															
104		NPVb				5 995 682															
105		NPVc				4 670 308															
106		B/C ratio				1.28															
107		Switching values Benefits				-22%															
108		Switching values Costs				28%															
109																					
110	la WOP-without project, WP-with project at full production																				
111	lb 3.75kg/m2/cycle, 22 cycles for WP and 1.5kg/m2/cycle, 6 cycles for WOP; 90% and 70% for the 1st grade in WP and WOP respectively																				
112	lc For WP - 60 days, 24 hours @ 0.5t per hour.																				
113	ld For WP: 2600W per hour, 24 hours per day, for 340 days; for WOP: 3KWh for 60 days per year.																				
114	le 100km on average																				
115																					

Table 28: Farm Model (WP improved sweet potato and banana) - 500 m²

MAP-Fin Analysis.xlsx - Excel

W2

A		B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	Economic and Financial Analysis																					
2	Republic of Maldives		1 US\$ = 15.35 MVR																			
3	Maldives Agribusiness Programme (MAP)																					
4	Farm Model (WP improved sweet potato and banana) - 500 m ²																					
5	Cropping pattern:																					
6	Cropping pattern:		Area, m ²		Yield,		Production, kg		Revenue, MVR		Investment cost, MVR		Operational costs, MVR		Hired labour, pd		Family labour, pd		Total labour, pd			
7			WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP		
8	Sw potato open field with irrigation		300		900	2 700		52 790		1 405		31 641			36		18		54	-		
9	Banana open field with irrigation		200		300	600		9 870		936		3 054			-		12		12	-		
10	Sw potato open field with drip fertigation		300	1 200		3 600		91 728		#####		57 980			54		18	-	72			
11	Banana open field with drip fertigation		200	800		1 600		39 200		73 834		25 507			16		12	-	28			
12	Total		500	500		3 300	5 200	62 660	#####	2 341	#####	34 695	83 487	36	70	30	30	66	100			
13	WITH PROJECT 1000 m ²																					
14																						
15	WOP 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20																					
16	Revenue		62660	130928	130928	130928	130928	130928	130928	130928	130928	130928	130928	130928	130928	130928	130928	130928	130928	130928		
17	investment Costs		2341	184584	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
18	Operational costs		34 695	83 487	83 487	83 487	83 487	83 487	83 487	83 487	83 487	83 487	83 487	83 487	83 487	83 487	83 487	83 487	83 487	83 487		
19	Gross Margin		25 624	(137 143)	47 441	47 441	47 441	47 441	47 441	47 441	47 441	47 441	47 441	47 441	47 441	47 441	47 441	47 441	47 441	47 441		
20	Returns to Family Labor		854	(4 571)	1 581	1 581	1 581	1 581	1 581	1 581	1 581	1 581	1 581	1 581	1 581	1 581	1 581	1 581	1 581	1 581		
21	Incremental net income			(162 767)	21 817	21 817	21 817	21 817	21 817	21 817	21 817	21 817	21 817	21 817	21 817	21 817	21 817	21 817	21 817	21 817		

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	Economic and Financial Analysis																				
2	Republic of Maldives		1 US\$ =	15.35 MVR																	
3	Maldives Agribusiness Programme (MAP)																				
4																					
5	Farm Model (WP improved sweet potato and banana) - 500 m ²																				
6	Cropping pattern:	Area, m ²	Yield,	Production, kg	Revenue, MVR	Investment cost, MVR	Operational costs, MVR	Hired labour, pd	Family labour, pd	Total labour, pd											
7		WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP				
8	Sw potato open field with irrigation	300		900	2 700	52 790		1 405		31 641		36		18		54	-				
9	Banana open field with irrigation	200		300	600	9 870		936		3 054		-		12		12	-				
10	Sw potato open field with drip fertigation		300	1 200		3 600		91 728		57 980		54		18	-	72					
11	Banana open field with drip fertigation		200	800		1 600		39 200		73 834		25 507		16		12	-	28			
12	Total	500	500	3 300	5 200	62 660	#####	2 341	#####	34 695	83 487	36	70	30	30	66	100				
13																					
14																					
15																					
16																					
17																					
18																					
19																					
20																					
21																					
22	Benefit/Costs Ratio	WOP	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
23			1.8	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
24																					
25																					
26																					
27																					
28																					
29																					
30																					
31																					
32																					
33																					
34																					
35	Financing Analysis	WVR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
36	Investments	MVR	184 584																		
37	Repayment Period	years	3																		
38	Grace Period	years	1																		
39	Interest Rate	%	6.0		\$																
40	Matching Grant	%	10	18 458	1 203																
41	Beneficiary Contribution	%	50	92 292	6 013																
42	Loan	MVR	73 834		4 810																
43																					
44		Without Project	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
45		With Project	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20
46	Principal Repayments		0.0	36 917	36 917																

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V		
1	Economic and Financial Analysis																						
2	Republic of Maldives																						
3	Maldives Agribusiness Programme (MAP)																						
4																							
5	Farm Model (WP improved sweet potato and banana) - 500 m2																						
6		Area, m2		Yield,		Production, kg		Revenue, MVR		Investment cost, MVR		Operational costs, MVR		Hired labour, pd		Family labour, pd		Total labour, pd					
7	Cropping pattern:	WOP	WP		WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP					
8	Sw potato open field with irrigation	300		900	2 700		52 790		1 405		31 641		36		18		54	-					
9	Banana open field with irrigation	200		300	600		9 870		936		3 054		-		12		12	-					
10	Sw potato open field with drip fertigation	300	1 200		3 600		91 728		#####		57 980		54		18	-	72						
11	Banana open field with drip fertigation	200	800		1 600		39 200		73 834		25 507		16		12	-	28						
12	Total	500	500		3 300	5 200	62 660	#####	2 341	#####	34 695	83 487	36	70	30	30	66	100					
13																							
14																							
15		WOP	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
46	Principal Repayments		0.0	36 917	36 917																		
47	Interest Repayments		2 215	4 430	2 215																		
48	Total Loan Repayments		2 215	41 347	39 132																		
49	Loan Outstanding		73 834	36 917	0																		
50																							
51	Short-term Loan																						
52	Working Capital (3-month operating costs for 6 months)		20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872		
53	Interest Repayment	6	1 252	1 252	1 252	1 252	1 252	1 252	1 252	1 252	1 252	1 252	1 252	1 252	1 252	1 252	1 252	1 252	1 252	1 252	1 252	1 252	
54																							
55	Cash Flow Analysis																						
56	Items	Without Project																					
57		Project	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
58	Inflow																						
59	Production Revenues	62 660	130 928	130 928	130 928	130 928	130 928	130 928	130 928	130 928	130 928	130 928	130 928	130 928	130 928	130 928	130 928	130 928	130 928	130 928	130 928		
60	Long-term Loan		73 834																				
61	Short-term Loan		20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872		
62	Matching Grant		18 458																				
63	Beneficiary's Contribution		92 292																				
64	Total Inflow	62 660	336 384	151 800	151 800	151 800	151 800	151 800	151 800	151 800	151 800	151 800	151 800	151 800	151 800	151 800	151 800	151 800	151 800	151 800	151 800		
65	Outflow																						
66	Production Costs	37 036	268 071	83 487	83 487	83 487	83 487	83 487	83 487	83 487	83 487	83 487	83 487	83 487	83 487	83 487	83 487	83 487	83 487	83 487	83 487		
67	Repayment of Loans																						

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	
1	Economic and Financial Analysis																						
2	Republic of Maldives																						
3	Maldives Agribusiness Programme (MAP)																						
4																							
5	Farm Model (WP improved sweet potato and banana) - 500 m2																						
6	Cropping pattern:		Area, m2		Yield,	Production, kg		Revenue, MVR	Investment cost, MVR	Operational costs, MVR	Hired labour, pd		Family labour, pd		Total labour, pd								
7			WOP	WP		WOP	WP	WOP	WP	WOP	WP		WOP	WP	WOP	WP							
8	Sw potato open field with irrigation		300		900	2 700		52 790		1 405		31 641		36		18		54	-				
9	Banana open field with irrigation		200		300	600		9 870		936		3 054		-		12		12	-				
10	Sw potato open field with drip fertigation		300	1 200		3 600		91 728		#####		57 980		54		18	-	72					
11	Banana open field with drip fertigation		200	800		1 600		39 200		73 834		25 507		16		12	-	28					
12	Total		500	500		3 300	5 200	62 660	#####	2 341	#####	34 695	83 487	36	70	30	30	66	100				
13																							
14																							
15																							
68	Long-term Loan		WOP		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
69					0	36 917	36 917	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
70	Short-term Loan				20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	20 872	
71																							
72	Repayment of Interest on Loans																						
73																							
74	Long-term Loan				2 215	4 430	2 215	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75	Short-term Loan				1 252	1 252	1 252	1 252	1 252	1 252	1 252	1 252	1 252	1 252	1 252	1 252	1 252	1 252	1 252	1 252	1 252	1 252	1 252
76	Total Outflow				37 036	292 410	146 958	144 743	105 611	105 611	105 611	105 611	105 611	105 611	105 611	105 611	105 611	105 611	105 611	105 611	105 611	105 611	105 611
77	Net Income after Financing				25 624	43 974	4 842	7 057	46 189	46 189	46 189	46 189	46 189	46 189	46 189	46 189	46 189	46 189	46 189	46 189	46 189	46 189	46 189
78	Incremental Net Income (AF)					18 350	(20 782)	(18 567)	20 565	20 565	20 565	20 565	20 565	20 565	20 565	20 565	20 565	20 565	20 565	20 565	20 565	20 565	20 565
79																							
80																							
81																							
82																							
83																							
84																							
85																							
86																							
87																							
74	Incremental Net Income (AF)				(20 782)	(18 567)	20 565	20 565	20 565	20 565	20 565	20 565	20 565	20 565	20 565	20 565	20 565	20 565	20 565	20 565	20 565	20 565	20 565
75	Farm model: improved sw potato and bar																						
76	Returns to labour																						
77	Returns to HH labour																						
78	Discount rate																						
79	NPV @ 0.07																						
80	IRR																						
81	NPVb																						
82	NPVc																						
83	B/C ratio																						
84	Switching values Benefits																						
85	Switching values Costs																						
86																							
87																							

Table 29: Farm Model (WP improved sw potato and diversification to papaya) - 500 m²

MAP-Fin Analysis.xlsx - Excel

The screenshot shows a Microsoft Excel spreadsheet titled "MAP-Fin Analysis.xlsx". The main title of the table is "Farm Model (WP improved sw potato and diversification to papaya) - 500 m²". The table is organized into several sections:

- Economic and Financial Analysis:** Includes currency conversion (1 US\$ = 15.35 MVR) and the Maldives Agribusiness Programme (MAP).
- Cropping pattern:** Details for Sw potato open field with irrigation, Banana open field with irrigation, Sw potato open field with drip fertigation, and Papaya open field with hydroponic.
- Total:** Summarizes the data for all crops across 500 m².
- WITH PROJECT 1000 m²:** Extends the analysis to 1000 m² for each crop type.
- Financial Metrics:** Shows Revenue, investment Costs, Operational costs, Gross Margin, Returns to Family Labor, Incremental net income, and Benefit/Costs Ratio.

The table uses a grid system with columns labeled A through V and rows numbered 1 through 24. Key data points include:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	Economic and Financial Analysis																					
2	Republic of Maldives		1 US\$ = 15.35 MVR																			
3	Maldives Agribusiness Programme (MAP)																					
4	Farm Model (WP improved sw potato and diversification to papaya) - 500 m ²																					
5																						
6	Cropping pattern:		Area, m ²		Yield,		Production, kg		Revenue, MVR		Investment cost, MVR		Operational costs, MVR		Hired labour, pd		Family labour, pd		Total labour, pd			
7			WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP		
8	Sw potato open field with irrigation	300		900	2 700		52 790		1 405		31 641		36		18		54	-				
9	Banana open field with irrigation	200		300	600		9 870		936		3 054		-		12		12	-				
10	Sw potato open field with drip fertigation	300	1 200		3 600		91 728		110 750		57 980		54		18	-	72					
11	Papaya open field with hydroponic	200	2 000		4 000		58 800		118 963		31 202		20		12	-	32					
12	Total	500	500		3 300	7 600	62 660	#####	2 341	229 713	34 695	89 183	36	74	30	30	66	104				
13																						
14																						
15																						
16																						
17																						
18																						
19																						
20																						
21																						
22																						
23																						
24																						

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	
1	Economic and Financial Analysis																						
2	Republic of Maldives		1 US\$ =	15.35 MVR																			
3	Maldives Agribusiness Programme (MAP)																						
4																							
5	Farm Model (WP improved sw potato and diversification to papaya) - 500 m2																						
6																							
7	Cropping pattern:	Area, m2		Yield,		Production, kg		Revenue, MVR		Investment cost, MVR		Operational costs, MVR		Hired labour, pd		Family labour, pd		Total labour, pd					
8		WOP	WP			WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP				
9	Sw potato open field with irrigation	300		900	2 700			52 790		1405		31641		36		18		54	-				
10	Banana open field with irrigation	200		300	600			9 870		936		3 054		-		12		12	-				
11	Sw potato open field with drip fertigation	300	1200		3 600			91 728		110 750		57 980		54		18	-	72					
12	Papaya open field with hydroponic		200	2 000		4 000		58 800		118 963		31202		20		12	-	32					
13	Total	500	500		3 300	7 600	62 660	150 528	2 341	229 713	34 695	89 183	36	74	30	30	66	104					
14																							
15																							
16		WITH PROJECT 1000 m2																					
55		WOP	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
56	Cash Flow Analysis																						
57	Items	Without Project																					
58		Project	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
59	Inflow																						
60	Production Revenues	62 660	150 528	150 528	150 528	150 528	150 528	150 528	150 528	150 528	150 528	150 528	150 528	150 528	150 528	150 528	150 528	150 528	150 528	150 528	150 528		
61	Long-term Loan		91 885																				
62	Short-term Loan		22 296	22 296	22 296	22 296	22 296	22 296	22 296	22 296	22 296	22 296	22 296	22 296	22 296	22 296	22 296	22 296	22 296	22 296	22 296	22 296	
63	Matching Grant		22 971																				
64	Beneficiary's Contribution		114 856																				
65	Total Inflow	62 660	402 536	172 824	172 824	172 824	172 824	172 824	172 824	172 824	172 824	172 824	172 824	172 824	172 824	172 824	172 824	172 824	172 824	172 824	172 824	172 824	
66	Outflow																						
67	Production Costs	37 036	318 896	89 183	89 183	89 183	89 183	89 183	89 183	89 183	89 183	89 183	89 183	89 183	89 183	89 183	89 183	89 183	89 183	89 183	89 183	89 183	
68	Repayment of Loans																						
69	Long-term Loan		0	45 943	45 943	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
70	Short-term Loan		22 296	22 296	22 296	22 296	22 296	22 296	22 296	22 296	22 296	22 296	22 296	22 296	22 296	22 296	22 296	22 296	22 296	22 296	22 296	22 296	
71	Repayment of Interest on Loans																						
72	Long-term Loan		2 757	5 513	2 757	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
73	Short-term Loan		1 338	1 338	1 338	1 338	1 338	1 338	1 338	1 338	1 338	1 338	1 338	1 338	1 338	1 338	1 338	1 338	1 338	1 338	1 338	1 338	
74	Total Outflow	37 036	345 286	164 272	161 515	112 816	112 816	112 816	112 816	112 816	112 816	112 816	112 816	112 816	112 816	112 816	112 816	112 816	112 816	112 816	112 816	112 816	
75	Net Income after Financing	25 624	57 251	8 552	11 308	60 007	60 007	60 007	60 007	60 007	60 007	60 007	60 007	60 007	60 007	60 007	60 007	60 007	60 007	60 007	60 007	60 007	
76	Incremental Net Income (AF)		31 627	(17 072)	(14 316)	34 383	34 383	34 383	34 383	34 383	34 383	34 383	34 383	34 383	34 383	34 383	34 383	34 383	34 383	34 383	34 383	34 383	
77																							

78	Farm model: improved sw potato and papaya
79	Returns to labour 577
80	Returns to HH labour 2 000
81	Discount rate 7.0%
82	NPV @ 0.07 276 985
83	IRR 77.2%
84	NPVb 1 970 320
85	NPVc 1 433 804
86	B/C ratio 1.37
87	Switching values Benefits -27%
88	Switching values Costs 37%

Table 30: Farm Model (WP improved sweet potato and diversification to cucumber) - 500 m²

MAP-Fin Analysis.xlsx - Excel

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Economic and Financial Analysis

Republic of Maldives

Maldives Agribusiness Programme (MAP)

Form Model (WP improved sweet potato and diversification to cucumber) - 500 m²

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	Economic and Financial Analysis																					
2	Republic of Maldives																					
3	Maldives Agribusiness Programme (MAP)																					
4																						
5	Form Model (WP improved sweet potato and diversification to cucumber) - 500 m ²																					
6																						
7	Cropping pattern:	Area, m ²		Yield, kg/m ²		Production, kg		Revenue, MVR		Investment cost, MVR		Operational costs, MVR		Hired labour, pd		Family labour, pd		Total labour, pd				
8		WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP			
9	Sweet potato open field with irrigation	400		400	3600	70387		1873	42188		48		24		72		-					
10	Banana open field with irrigation	100		300	300	4935		468	1527		-		6		6		-					
11	Sweet potato open field with drip irrigation	400	1200		4800	122304		147667	77307		72		24		-	96						
12	Cucumber green house with hydroponic	100	25500		25500	749700	348445	611465	250		6		6		256							
13	Total	500	500		3900	30300	75322	872004	2341	496112	43715	688772	48	322	30	30	78	352				
14																						
15																						
16																						
17																						
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28																						
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30																						
31																						
32																						
33																						
34																						
35																						
36																						

Table 31. Farm Model (WP improved sw potato and diversification to lettuce) - 500 m2

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1 Economic and Financial Analysis																					
2 Republic of Maldives		1 US\$ =	15.35 MVR																		
3 Maldives Agribusiness Programme (MAP)																					
4																					
5 Farm Model (WP improved sw potato and diversification to lettuce) - 500 m²																					
6																					
7 Cropping pattern:		Area, m ²	Yield,	Production, kg		Revenue, MVR		Investment cost, MVR		Operational costs, MVR		Hired labour, pd		Family labour, pd		Total labour, pd					
8		WOP	WP		WOP	WP		WOP	WP	WOP	WP		WOP	WP		WOP	WP				
9 Sw potato open field with irrigation		400		900	3 600		70 387		1873		42 188		48		24		72	-			
10 Banana open field with irrigation		100		300	300		4 935		468		1527		-		6		6	-			
11 Sw potato open field with drip fertigation		400		1200		4 800		122 304		147 667		77 307		72		24		96			
12 Lettuce closed vertical system		100		8 250		8 250		565 950		277 221		440 844		220		6		-	226		
13 Total		500		500		3 900		13 050		75 322		688 254		2 341		424 888		43 715		518 151	
14																					
15																					
16		WOP		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
35																				19	20
36 Financing Analysis																					
37 Investments			MVR	424 888																	
38 Repayment Period			years	3																	
39 Grace Period			years	1																	
40 Interest Rate			%	6.0		\$															
41 Matching Grant			%	10	42 489	2 768															
42 Beneficiary Contribution			%	50	212 444	13 840															
43 Loan			MVR	169 955		11072															
44																					
45		Without	With Project																		
46		Project		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
47																				19	20
48 Principal Repayments				0.0	84 978	84 978															
49 Interest Repayments				5 099	10 197	5 099															
50 Total Loan Repayments				5 099	35 175	90 076															
51 Short-term Loan																					
52 Working Capital (3-month operating costs for 6 months)				129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	
53 Interest Repayment				6	7 772	7 772	7 772	7 772	7 772	7 772	7 772	7 772	7 772	7 772	7 772	7 772	7 772	7 772	7 772	7 772	
54																					
55 Cash Flow Analysis																					
56 Items		Without	With Project																		
57		Project		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
58 Inflow																				19	20
59 Production Revenues		75 322	688 254	688 254	688 254	688 254	688 254	688 254	688 254	688 254	688 254	688 254	688 254	688 254	688 254	688 254	688 254	688 254	688 254	688 254	
60 Long-term Loan			169 955																		
61 Short-term Loan			129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	
62 Matching Grant			42 489																		
63 Beneficiary's Contribution			212 444																		
64 Total Inflow		75 322	1242 680	817 792	817 792	817 792	817 792	817 792	817 792	817 792	817 792	817 792	817 792	817 792	817 792	817 792	817 792	817 792	817 792	817 792	
65 Outflow																					
66 Production Costs		46 056	943 039	518 151	518 151	518 151	518 151	518 151	518 151	518 151	518 151	518 151	518 151	518 151	518 151	518 151	518 151	518 151	518 151	518 151	
67 Repayment of Loans				Long-term Loan	0	84 978	84 978	0	0	0	0	0	0	0	0	0	0	0	0	0	0
68				Short-term Loan	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538
69																					

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	Economic and Financial Analysis																				
2	Republic of Maldives	1 US\$ =	15.35 MVR																		
3	Maldives Agribusiness Programme (MAP)																				
4	Farm Model (WP improved sw potato and diversification to lettuce) - 500 m ²																				
5																					
6	Cropping pattern:	Area, m ²		Yield,		Production, kg		Revenue, MVR		Investment cost, MVR		Operational costs, MVR		Hired labour, pd		Family labour, pd		Total labour, pd			
7		WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP	WOP	WP		
8	Sw potato open field with irrigation	400		900	3 600		70 387		1873		42 188		48		24		72	-			
9	Banana open field with irrigation	100		300	300		4 935		468		1527		-		6		6	-			
10	Sw potato open field with drip fertigation		400	1 200		4 800		122 304		147 667		77 307		72		24	-	96			
11	Lettuce closed vertical system		100	8 250		8 250		565 950		277 221		440 844		220		6	-	226			
12	Total	500	500		3 900	13 050	75 322	688 254	2 341	424 888	43 715	518 151	48	292	30	30	78	322			
13																					
14																					
15		WITH PROJECT 1000 m ²																			
68	Long-term Loan	WOP	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
69	Short-term Loan	0	84 978	84 978	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
70	<i>Repayment of interest on Loans</i>	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538	129 538
71	Long-term Loan	5 099	10 197	5 099	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
72	Short-term Loan	7 772	7 772	7 772	7 772	7 772	7 772	7 772	7 772	7 772	7 772	7 772	7 772	7 772	7 772	7 772	7 772	7 772	7 772	7 772	7 772
73	Total Outflow	46 056	1085 448	750 636	745 537	655 461	655 461	655 461	655 461	655 461	655 461	655 461	655 461	655 461	655 461	655 461	655 461	655 461	655 461	655 461	655 461
74	Net Income after Financing	29 266	157 232	67 156	72 254	162 331	162 331	162 331	162 331	162 331	162 331	162 331	162 331	162 331	162 331	162 331	162 331	162 331	162 331	162 331	162 331
75	Incremental Net Income (AF)	127 966	37 890	42 988	133 065	133 065	133 065	133 065	133 065	133 065	133 065	133 065	133 065	133 065	133 065	133 065	133 065	133 065	133 065	133 065	133 065
76																					
77	Farm model: improved sw potato and lettuce																				
78	Returns to labour	504																			
79	Returns to HH labour	5 411																			
80	Discount rate	7.0%																			
81	NPV @ 0.07	####																			
82	IRR	#NUM!																			
83	NPVb	8 538 422																			
84	NPVc	7 054 708																			
85	B/C ratio	1.21																			
86	Switching values Benefits	-17%																			
87	Switching values Costs	21%																			



Investing in rural people

Maldives

Maldives Agribusiness Programme

Project Design Report

Annex 5: Social Environment and Climate Assessment (SECAP) Review Note

Mission Dates: 12 - 29 November 2019

Document Date: 22/06/2020

Project No. 2000002416

Report No. 0000

Asia and the Pacific Division
Programme Management Department

Maldives Agriculture programme (MAP)

Annex 5. Social Environment and Climate Assessment Procedures (SECAP) Review Note

I. Introduction

1. The **goal** of the Maldives Agriculture programme is to sustainably increase the incomes, food security and nutritional status of smallholder farmers. MAP's **development objective** is to strengthen the enabling environment for sustainable and climate-resilient agriculture. This objective will be achieved through policy refinement, strengthened services and institutions, enhanced agricultural technologies and better access to financing and markets for smallholder farmers.
2. The programme will support the agribusiness development in Maldives by investing in the generation and transfer of climate-smart technologies of modern agriculture, which are tailored to respond to the needs of agricultural production enhanced to meet with the identified market opportunities. This will be achieved through activities supported under **three technical components**: (i) enabling policy, institutions and services (component 1); (ii) climate-smart production (component 2); and (iii) market connection (component 3). MAP will be supported by a 4th programme management component.
3. Activities supported under Component 1 include: (i) providing support to establish policies (research, studies, strategies and bylaws); (ii) strengthening institutional capacity of the Ministry of Fisheries, Marine Resources and Agriculture (MOFMRA) and its Agriculture Research Centre (ARC) located in Hanimadhu Island. In the latter case this includes support for new facilities (e.g., laboratory, greenhouses), systems (vertical production, hydroponic, drip fertigation) and related equipment (e.g., water quality and tissue sampling equipment and reagents, grafting and photovoltaic); and (iii) support to MOFMRA/MED for the soon to be established Maldives Agriculture Corporation (MACO) in the form of training the Corporation's staff and subsequent provision of agricultural inputs and equipment to promote the adoption of new production systems among the smallholder farmers, and disseminating Maldives Good Agricultural Practices (MGAP) in conjunction with sustainable, climate-smart informed input management. Main expected outputs are: (i) policy knowledge products on sustainable and climate-resilient agriculture; (ii) upgraded capability to generate knowledge and technology; (iii) packages of recommendations developed for enhancing economic return for small holder farmers; (iv) new technologies and improved inputs transferred to smallholder farmers; and (v) establishment of an Agriculture Information and Communication Technology (AICT) Service.
4. Following the training and transfer activities supported under component 1, MAP's second component will support the rolling out of services in support of climate-smart production of high value commodities for farmers using inputs supplied by MACO based on the seeds and technologies/production packages developed and validated by ARC with agricultural financing provided from Small and Medium Enterprise Development Finance Corporation (SDFC) and the Maldives Finance Leasing Company (MFLC). The main outputs will be: (i) beneficiaries trained on production practices and technologies; (ii) farmer production forums organized in order to provide required quantity and quality of products in response to the market opportunities; and (iii) improved access to agriculture financing.
5. Activities supported under the programme's 3rd component will invest in supporting market connections through providing support for market linkage arrangements, matching grants to help establish cold storage facilities in the three programme island hubs, regional hubs and sub-regional hubs, support to cargo vessels for upgrading cold storage in exchange of agreed transport services, and possibly for purchase of refrigerated cargo vessels on a Hire-Purchase

basis. The main output will be the establishment of supply contracts between producers and private companies.

6. The MAP is a **national programme** and will cover all regional and sub-regional hubs, clusters and islands where agriculture is undertaken by small farmers. The main programme hubs for programme activities are in regions 1-3 are Haa Alif Hoarafushi (region 1), Haa Dhaalu Vaikaradhoo (region 2) and Shaviyani Milandhoo (region 3). These hubs will serve 8, 9 and 9 inhabited agriculture islands respectively. MAP's component 1 will cover all 19 atolls, 21 regions covering 188 inhabited islands of these 98 are inhabited where agriculture is practised on around 800 registered hectares. There are also 50 uninhabited islands leased for commercial agriculture in the programme are representing 956 hectares of land of which 24 islands are actively doing agriculture on 582 hectares of land. Component 2 will initially focus on regions 1-3, covering 3 atolls and 40 inhabited islands. Of these, 26 are inhabited agriculture islands with 280 hectares registered land cultivated by registered farmers, and 85 hectares cultivated by non-registered farmers. Within this production area there are six active commercial islands cultivating a total of 250 hectares. Finally, component 3 will initially focus on regions 1-3 during the first two years and then expand to 4-7 and eventually cover the whole country.

7. The MAP's **target groups** are small farmers consisting of men, women and youth belonging to households of different socio-economic categories. Small farmers who depend mainly on agriculture for their livelihood are economically one of the most vulnerable groups in the country. Women and youth continue to be important proportions of the active labour force in agriculture; they are also important actors in achieving food security and improved nutrition.

8. The overall responsibility for the MAP implementation will be assumed by the Ministry of Fisheries, Marine Resources and Agriculture (MOFMRA), which is the Lead programme Agency. The Ministry of Finance (MOF) will be responsible for ensuring timely flow of funds to MOFMRA for programme implementation. A programme Steering Committee (PSC) chaired by the Permanent Secretary of MOFMRA and encompassing representatives from the related ministries such as MOF, Ministry of Economic Development (MED), Ministry of National Planning and Infrastructure (MONPI), MOE and other stakeholders that are related and relevant to the programme. A programme Implementation Unit (PIU) will be established in the Planning and programme Coordination Section of MOFMRA and located within or in proximity of MOFMRA. The PIU will be responsible for the overall operational management and coordination of the programme implementation.

9. The total investment and incremental recurrent programme costs for this 5 year programme is an estimated USD 12.9 million. This consists of an: (i) IFAD loan of USD 3.285 million (25.5% of the total programme costs); (ii) an IFAD grant of USD 1.215 million (9.4%); (iii) SDFC loans of USD 5.0 million (38.8 %); (iv) private sector investments (USD 1.14 million (8.8 %) and (v) a government cash contribution of USD 2.25 million (17.4 %).

10. The main objective of this SECAP Review Note is to provide information in a short, precise document, on the social, environmental and climate change issues relevant to the design of a specific project or programme. During the RN preparation process, the team assessed how these issues might affect IFAD's mainstreaming themes (gender, youth, nutrition, indigenous peoples, climate and environment) and made specific recommendations on how the project can mitigate risks and better include social and environmental concerns in its design.¹

¹ The existing document revised and updated the earlier draft RN prepared in November 2019 following the preparation of the draft PDR in December 2019.

II. Situational Analysis and Potential Project Impacts

12. The Republic of the Maldives consists of a double chain of 26 atolls that *in toto* are composed of 1,192 small coral islands.² Of these, 188 are inhabited. The inhabited islands are classified into categories defined by their predominant use. These are: tourism (200), commercial agriculture (75), multiple use such as industrial and waste deposit (20) and inhabited characterized by small farmers and fishermen (197). It is these latter 197 islands where the main direct beneficiaries of the project will be targeted.

13. Specific socio-economic data for the small farmers on these islands are limited. The last national census was conducted in 2014. Data collected in that census consists of farmers and fishers and are not disaggregated. Data from the registration of farmers (see below) with the village councils are limited to names, gender and area of the farm. These data are transferred to MFMRA in Malé. Based on this latter data source there is an estimated 7,500 and 2,500 registered and unregistered farmers, respectively. Total arable land is approximately 3,000 ha of which 1,800 ha is in production (including coconut lands).

Socio-economic Assessment

Overall poverty situation.

14. According to the national poverty line (MVR 74 per person per day) 8.2 percent of the Maldivian people are poor (HIES 2016). In terms of inequality, although Gini's Coefficient shows a decline over the years from 0.41 in 2003 0.31 in 2016, inequality persists with a rising incidence of poverty and a steady flow of migrants from atolls to Malé in search of jobs and basic services. Regional disparities are significant with 12.8 percent of the people living below the poverty line in the rural islands compared to 1.7 percent in Malé. The HIES survey reveals that 38 percent of the Maldivians fall between the 25th and 50th percentile indicating that a significant portion of the population remains vulnerable to falling back into poverty if their household situation changes for the worse.

15. With a significant socio-economic and socio-cultural divide between rural and urban population, as well as large differences in gender and age, the small rural farmers who depend on agriculture as a livelihood activity are economically one of the most vulnerable groups within the country. Poverty when correlated with economic sector (defined by head of household) indicates that those working in the agriculture and fisheries sectors are found to be poorer than those in industry or services. The situation is worse for women with a high rate of divorce combined with limited employment opportunities contributing further to their level of impoverishment. These figures indicate the importance of the programme in alleviating poverty within the rural agriculture sector.

Gender.

16. The Maldives ranks 101st of 164 countries rated by the Gender Development Index (2017), 106th of 144 countries rated by the Gender Gap Index (2017) and 76th of 160 countries rated by the Gender Inequality Index (2017). These rankings confirm that much needs to be done to improve women's empowerment and access to services and opportunities.

17. *Literacy and education.* Figures from the 2014 census reveal that the sex ratio is 103 males per 100 females. Nor is there much difference in literacy in the mother tongue is 97.4 percent and 98 percent for males and females, respectively. A gender gap however can be clearly seen in level of education. Up to the diploma level not much difference is observed but

² The definition of island in the Maldives is any exposed feature that is vegetated.

from there on there is a significant gender gap in favour of males in Bachelor, Masters and Doctoral degrees accounting for 71 %, 75 % and 70 %, respectively. Women's participation in the labour force, is only 48 percent in 2014. The main reasons for female unemployment are identified as lack of job opportunities (35 %), followed by the inability to find a suitable job (28 %), caring for the family and home (13 %) and lack of adequate education (6 %).

18. *Decision making.* The Country Gender Assessment of the Agriculture and Rural sector of Maldives (2018) states that the gender gap in decision-making and the lack of livelihood activities for women at the island level is a challenge to women's empowerment in the rural sector. Society and cultural norms place men in the lead, particularly in the rural areas. Rural women often lack the capacity to plan and implement activities, as they lack proper training in technical skills required for jobs which the project directly addresses.

19. *Poverty and inequality.* Poverty indicators for Maldives show a decline in income inequality and an overall improvement in the living standard of the population, mainly attributed to the booming tourism industry. Inequality, as measured by the Gini coefficient, declined from 0.41 in 2003 to 0.37 in 2010. Poverty, based on the Millennium Development Goal (MDG) indicator of the percentage of the population living on less than USD 1 per day, declined from 9 percent in 2003 to 8 percent in 2010. Despite these achievements, inequities persist, with rising poverty incidence in the capital due to the steady flow of migrants from the atolls to Malé in search of jobs and basic services (May 2016; NBS, 2018b). There are considerable socio-economic and sociocultural divides between urban and rural populations, as well as by gender and age group (Shafeega and Shakir, 2016). A high rate of divorce combined with limited employment opportunities for women in the Maldives gives rise to additional poverty for women as single parents in FHHs. Women in such positions are more susceptible to health risks due to the stress of the multiple burdens placed upon them, as breadwinners and caretakers who are responsible for all domestic chores. In poorer households, where overcrowding results from more people living in less space, the health of women is placed at even greater risk (Shafeega and Shakir, 2016). Women continue to be discriminated against in health care and in the labour market. This is illustrated by the Gender Inequality Index (GII), which reflects a disadvantage in three dimensions – reproductive health, empowerment and the labour market. In addition, Maldivian women experience specific reproductive health issues, with access to sexual and reproductive health services being limited. In many cases they also face domestic violence (May, 2016).

20. *Agriculture sector.* In the agriculture sector, gender division and roles and responsibility exist with women contributing to crop production, value addition and natural resource management. Often women assist their male counterparts in farming activities while they are also fully engaged in related value-added activities. Generally, selling produce is considered the man's responsibility. Although gender roles are largely fixed in agriculture and fisheries, as modernization brings changes to the island way of life, some women are taking up roles traditionally performed by men as the need arises. Women in rural areas however, continue to dominate traditionally less rewarding roles in such as home gardening, taro farming and coconut collection. This includes growing different types of fruits and vegetables in the front/backyards of their home as well as in small isolated plots. This produce is often used for household consumption or sold on the island or to neighbouring islands. Women, particularly elderly women, collect coconuts from the forest areas on islands where land is abundant. With an existing and growing market for products such as taro, coconut and processed agricultural produce, women in rural islands earn a significant income. This reflects the importance of informal home-based work in women's livelihoods, which national statistics do not recognise.

21. Women play a significant role in the processing and manufacturing subsector under fisheries and agriculture. Rope weaving (roanuveshun), preparing thatch from dried coconut

leaves (fangivinun), processing of fruits and vegetables, and making spice products (havaadhu) and other food products have a much higher female participation rate than male. Women's occupations that fall under manufacturing are mostly small-scale, self-employed and undertaken at home rather than in organized formal workplaces. Such small-scale manufacture, like processing of agricultural products and the preparation of food products, is mostly in the informal sector and women often carry out this type of work in their living quarters. These self-employed women earn a remuneration that is not a fixed monthly income, and is subject to demand and market dynamics at any given time. The distribution of the employed population by place of work gives further insight into the gender dynamics of employment. A greater proportion of employed women (32 percent) work in their homes or living quarters than the proportion of employed men who do so. Overall, women account for 84 percent of home-based workers. For those involved in the processing of agricultural products (fruits, vegetables and spices), the level of vulnerability is greater, as severe weather conditions such as flooding can destroy the harvest. Other factors such as expatriate labour also have an impact on the roles of women in fisheries and agriculture. Women are disadvantaged when land and other assets are not registered under their name. According to observations in the field, women who are divorced, widowed or for other reasons have to support themselves and their family often undertake backyard gardening, taro farming or coconut collection as livelihood activities. Time-consuming responsibilities at home and limited opportunities hinder them from being involved in activities that are more lucrative.

22. In the household level women make decisions pertaining to the day-to-day running of the household, however other decisions such as purchase of assets and construction of the house, are dominated by men often with limited consultation with women. The aforementioned assessment report also highlights that ownership of assets are mostly in the name of the man. Data on home ownership from the 2006 census indicates that 65.5 percent are owned by men.

23. While the women play a significant role in the processing and manufacturing subsector under fisheries and agriculture, their contribution appears to be limited to labour without any significant role in the management and financing of the farms. Women represent an asset for the Maldives if they can be turned into a dynamic force by effective organisation. The programme will directly address the constraints of the farmers, focusing on facilitating their access to inputs and markets and the participation in training. With 52 percent registered farmers being female, MAP will build up their skills through training, awareness and advisory services to plan and implement activities. Much needed training in financial literacy, business management and farm financial analysis, basic and specialised agriculture will be provided to the farmers to build up their capacity. *National policies, strategies and actors.* At the global level, Maldives is a signatory to a range of international laws and regulations on gender equality, including the Beijing Platform for Action for Women's Rights of 1995, the Cairo Plan of Action for Reproduction and Sexual Rights of 1994, and the Convention on the Elimination of All Form of Discrimination Against Women (CEDAW) of 1979. The Constitution of Maldives guarantees equal access for women and men to human rights and freedom, and the government is tasked with ensuring this equality. Women gained the right to vote in the country's first Constitution in 1965, but it was prohibited for a woman to become a president of the country until the new Constitution came into effect in 2008. The new Constitution guarantees the same rights and freedoms, and upholds the principles of non-discrimination and equality of men and women.

24. The main administrative arm of the government responsible for gender equality is the Minister of Gender, Family and Social Services (MoGFSS). Planning, implementation and coordination of the legal frameworks and policies to improve women's status through the enhancement of women's rights, economic empowerment, welfare support and protection of women, including prevention of violence against women and girls, are fundamental to the mandate of the institution. The legal architecture for gender equality in Maldives continues to be

inadequate, although a number of recently ratified acts address the gender gap. The Maldives Gender Equality Act 2016–2021, published in 2015, has four main policy goals. The first policy goal is to develop and activate the necessary policy, legislative and institutional frameworks for gender equality, so that women and men enjoy fundamental human rights and rewards of democracy equal to those of men. The second goal emphasises women's empowerment to facilitate their equal access to available opportunities, as well as equal outcomes/results. The third policy goal is to cultivate a culture of non-discrimination and respect for women's human rights and fundamental freedoms in the political, economic, social, cultural, civil and all other fields on a basis of equality between men and women. The fourth goal aims at eliminating all forms of discrimination against women. The President ratified the Gender Equality Act in August 2017.

25. In addition, a number of other pieces of legislation address gender equality, including the Penal Code of 2015, which was amended to define rape; the Sexual Harassment and Abuse Prevention Act of 2015; and the Domestic Violence Prevention Act of 2012, which opened up a supportive platform for reporting cases of abuse, the majority faced by women. The impact of these laws on women's progress has not yet been reviewed and so is unclear, and CEDAW in 2015 has reiterated its concerns regarding the persistent barriers faced by women in gaining access to justice. The Committee on the Elimination of Discrimination Against Women, the body that oversees CEDAW has further highlighted issues of judiciary bias and gender stereotyping, the absence of gender-sensitive procedures and the limited capacity of law enforcement institutions, including Maldives Police Services, to deal with women's complaints about violations of their rights.

26. At the Project level, a Grievance Redress Mechanism will be established in line with IFAD policies and procedures and national laws. The GRM will include the following steps:

- a. Step 1: Submission of grievances either orally, in writing, or through telephone hotlines/toll free numbers, SMS, to the Ministry of Fisheries, Marine Resources and Agriculture (MOFMRA)
- b. Step 2: Recording of grievances, classifying the grievances based on the typology of complaints and the complainants in order to provide more efficient response, and providing the initial response within 24 hours. The typology will be based on the characteristics of the complainant (e.g., vulnerable groups, persons with disabilities, people with language barriers, etc.) and also the nature of the complaint
- c. Step 3: Investigating the grievance and Communication of the Response within 7 days
- d. Step 4: Complainant Response: either grievance closure or taking further steps if the grievance remains open. If grievance remains open, complainant will be given opportunity to appeal to the MOFMRA.
- e. Once all possible avenues of redress received grievances have been proposed and if the complainant is still not satisfied then s/he would be advised of their right to legal recourse. In addition, the existing GRM will also be used for addressing Sexual Exploitation and Abuse in line with IFAD's no tolerance for Sexual Exploitation and Abuse (SEA) policy.

Youth.

27. In the Maldives youth is defined as young men and women aged between 18 - 34. In the 2014 Population and Housing Census it was established that the population below the age of 25 represents 47.5 percent of the resident population. Maldivian youth remain in school until

ages 17 or 18 achieve close to 100 per cent and 90 percent literacy in Dhivehi and English, respectively.

28. The proportion of men and women 15 to 34 not in education, employment or training (NEET) shows a steady, steep rise from ages 15 to 19 when about 27 per cent of men and women are not in NEET. Then beginning at age 19, the NEET rate falls continuously for men, stabilizing at 6 per cent for ages 30 and older. While the NEET rate is similar for men and women 15 to 20, it is higher for women 20 and older. The NEET rate is significantly higher for women than men in the atolls.

29. Young people make up a significant proportion of the labour force. More than half (54 per cent) of the labour force is aged 18 to 34 while 23 per cent is 15 to 24. Most young people join the labour force by the time they are in their early twenties. Unemployment rates among youth (18-34) is 8 percent (HIES, 2016).

30. Most natives of the capital Malé seek opportunities in that area. However only about one third of young Malé residents are actually from the island as many migrate from the other islands (the atolls) in search of employment opportunities.

Indigenous peoples. NA.

People living with disabilities. NA

Migrant workers.

31. Due to the influx of migrants into the labour force worker profiles are changing in many economic sectors including agriculture in the Maldives. The 2014 census reports that of the total population employed in the fisheries and agriculture sectors, 8 percent are foreign residents, of whom the majority are men. However, migrant workers also contribute informally to the sector which is not reflected in the data. Traditionally agricultural practices on the islands have defined gender roles, with men generally doing the heavy work, such as transporting and clearing, while women are involved in work such as watering and harvesting. Today often male migrant workers have largely taken over the agriculture sector and are often found in production and marketing networks as resident Maldivian men seek employment opportunities in the more lucrative tourism sector, away from their island homes. To some extent, migrant workers are increasingly taking over the work of women in subsistence agriculture, as their full-time commitment to agricultural activities affords them greater productivity. In some islands it is also common for migrant workers to informally rent agricultural fields from locals, paying them a monthly rent.

32. With this changing labour role within the agriculture sector, MFMRA faces challenges in providing its services to the farming community as training, and extension and other support services are provided only to local Maldivians. The migrant workers who are engaged in agriculture often do not have access to this information on good practices and misuse chemical pesticides. It is reported that there have been a number of cases of misuse of chemical pesticides due to lack of knowledge on the products and their uses. Taking into consideration this aspect the project will target all farmers good practices on farming and use of chemicals

Nutrition.

33. The demographic and health survey 2017 - 2018 reveals that 15 percent of children under 5 years are stunted (short for their age) 9 percent are wasted (thin for their height) and 15 percent are underweight (thin for their age). Stunting, a sign of chronic under nutrition reflects failure to receive adequate nutrition over a long period. Half of the children age 6 - 59 months and 63 percent of the women aged 15 - 49 years are anaemic, a condition marked by

low levels of haemoglobin in the blood. Weaning and feeding practices of infants and children are a major factor for the continued malnutrition problem; deficiencies in iron, zinc and vitamin A were found to be of significant concern, particularly among women and pregnant women. The underlying causes of malnutrition are food insecurity, poor dietary diversity child feeding practices. The survey reports that feeding practices of only half of the children age 6 - 23 months in the Maldives meet the minimum standards. In terms of access to health services In the Maldives, more than 7 in 10 women (72 %) stated that problems in accessing health care exists and the reasons include distance to health facility, difficulty in getting appointments among other reasons.

34. It is not uncommon for rural populations to experience some form of food shortage, especially for nutritious fresh products such as milk, eggs, vegetables and fruit at times. Additionally, during the dry season, water shortages on the islands are a common concern. Maldives fulfils the bulk of its food and nutritional security through imports with 20 percent of total imports for food items including agricultural imports (including staple foods, such as rice, flour and sugar; and vegetables, root crops, fruits, nuts and seeds, dairy and eggs). Food imports are required to meet domestic food demands of the Maldivian people, as well as being essential in supplying the tourism industry. Import dependency, limited storage facilities and ad hoc distribution of food pose food insecurity risks, especially with more and more severe natural disaster events occurring due to climate change.

35. Food trade, storage and distribution play a critical role in the access and availability dimensions of food security. With the ocean constituting 99 percent of the Maldives' territorial area, and with distantly located small island populations scattered across the country, marine transport is the most important mode of travel. Due to the geographic dispersion of the islands, large stocks of food items and other consumer durables, along with fuel and other necessary raw materials, have to be transported from Malé to the rural areas of other islands. Food distribution from the greater Malé area to the islands is undertaken primarily by cargo boats and to a lesser extent by air. The quantity transported in a single trip is limited and delivery is often unscheduled and unreliable thus many islands experience occasional food and water shortages each year, with some reporting frequencies of as many as four times a year.

36. Import dependency, limited storage facilities and ad hoc distribution of food pose food insecurity risks, especially with more and more severe natural disaster events occurring due to climate change. Risks, including natural hazards and financial and political crises (both internally and externally), can affect food transportation and the availability of important goods. The Government of Maldives is working with international agencies and private-sector partners to develop the country's capacity in fisheries and aquaculture, crop cultivation, poultry and animal husbandry. It developed a fisheries policy in 2017 and has formulated an agriculture policy to address gaps in natural resource management. Furthermore, discussions are underway with MoFA on diversifying fisheries and intensifying production of potential crops for self-sufficiency through the introduction of new technology and farming practices.

37. Malnutrition among women of reproductive age also continues to be of concern. MDHS findings showed that 8 percent of women aged 15–49 years are too thin, with a body mass index less than 18.5, and 46 percent are overweight or obese. While overweight and obesity prevalence is high, micronutrient deficiencies are also high in this age group. According to a micronutrient survey conducted by the Ministry of Health in 2007, 15.4 percent of women of reproductive age were found to be anaemic to some degree and 15.1 percent are moderately anaemic. Micronutrient deficiencies for women of reproductive age follow the same pattern as in children, with 38 percent being iron deficient, 44 percent vitamin A deficient, 27 percent zinc deficient and 27 percent iodine deficient (Ministry of Health, 2016).

38. This aspect reflects the critical role the programme will play to improving food security and nutrition status through increase quantity, quality and diversity of food within the rural islands.

Environment and Climate Context, Trends and Implications

Environmental Assessment.

39. Most of the environmental issues relevant to MAP are well known and are described in some detail in a number of sources (see Section 9 below)³. These include:

Water quantity. The country has few surface water resources. Most sources of freshwater exist in the form of shallow, groundwater aquifers with a depth averaging between 3 – 5 meters and located within one to two meters from the surface. In most of the inhabited island these aquifers are becoming depleted due to over-extraction initially for potable water but increasingly for irrigation and other domestic uses. Over-extraction in turn can contribute to seawater intrusion; a situation exacerbated by reduced recharge from rainfall due to the paving over of the islands' porous soils. Saltwater intrusion is likely to worsen with sea level rise (SLR). Many islands suffer from deficit gaps in potable water during prolonged periods of drought. Increased use and efficiency in water harvesting may be the most economically viable option supplemented by desalination plants in the more populated islands. For agriculture there is growing interest in hydroponics, drip irrigation and planting climate smart varieties in response to these issues;

Water quality. In addition to the effects of saltwater intrusion, the major sources of aquifer contamination in the country's non-urban islands are: (i) point source pollution from discharge of untreated wastewater, (ii) poorly planned disposal of solid waste and (iii) overuse of agro-chemicals⁴ The amount of agro-chemicals consumed in the islands is not recorded and despite restrictions on the import of certain pesticides based on their toxicity there appear to be few controls on their presence or consumption in local markets (MEE, 2017). There exist however a number of national programs that to varying degrees are being implemented in the outer islands that are addressing this issue that have been described in more detail below (see section 3). In the agricultural sector this includes: Integrated Pest Management, training and certification in Maldives-Good Agricultural Practices (M-GAP), training in better use of compost and the use of small-scale hydroponic schemes. These efforts are facilitated by a growing awareness among farmers of the added value in certain sub-sectors in the local market (e.g., tourist islands) derived from high quality produce (re free of chemicals);

Waste management. Solid waste management has grown to become one the country's biggest environmental threats.⁵ In terms of total waste generation, the country's resort islands and international airport generate waste at nearly six times the rate of the resident local population. Waste management varies among islands depending on the availability of disposal facilities and local custom. On rural islands, the common practice is to dispose of wastes in open sites followed by burning and/or directly thrown into the ocean.⁶ The government has undertaken several initiatives to address the waste management issue but disposal and treatment capacity to date

³ However, in some cases there are gaps in site-specific data and/or are in need of updating.

⁴ There are few groundwater assessments from the Maldives however one was completed for four islands (B. Hithaadhu, Hithadhoo, Gn. and Ga. Dhekanbaa) as part of the 2nd National Communications (SNC) of the Maldives to the UNFCCC. Samples indicated significant contamination in particular in fecal coliform counts (SOE, 2016).

⁵ An estimated 365,000 tons of solid waste are generated annually. Most recent estimates indicate that solid waste is generated at a rate of 1.8 kg per person per day in Malé, 0.8 kg per person per day on the other inhabited islands, and 3.5 kg per person per day in resort islands. (MTAC, 2015).

⁶ Composition of waste streams from inhabited non-urban islands in the Maldives by percent is estimated to be: food, garden/yard waste, paper (70 %), metals and plastic (3 %) and construction debris, organic and inorganic waste, hazardous substances, etc. (27 %).

remains insufficient.⁷ In the agricultural sector the main sources of solid waste include agro-chemical containers, vegetative matter, discarded growing materials (associated with nurseries, greenhouses/hydroponic schemes) and packing materials. There are several ongoing projects that are attempting to address this issue (see section 3 below); and

Chemical management. While there is currently no production of chemicals in Maldives, the import of chemicals has increased significantly over the last two decades. The main demand sectors are energy and transport (petroleum products), agriculture, construction, boat building, health and tourism. Demand is likely to grow with further diversification of the economy. Despite a number of legal requirements, implementation and monitoring has been relatively ineffective due to the lack of a national chemicals database, coordination mechanisms and lack of trained personal at the island level. There is no capacity to analyse for pesticides in the country and samples have to be sent to Sri Lanka. The main agricultural sector imports are chemical fertilizers (mostly from Sri Lanka) and pesticides dominated by insecticides (India, Singapore, Indonesia and Sri Lanka).⁸ Some of the main challenges in the agricultural sector are: insufficient control of cheap and low-quality inputs, low technical skills of farmers and insufficient access to extension services, particularly in the outer islands.⁹

Climate Trends and Impacts.

40. The Maldives' fragile ecological profile and low elevation combined with its economic dependence on limited sectors combine to make the country highly vulnerable to the effects of climate change (CC). A total of five assessment reports (ARs) have been completed to date by the Intergovernmental Panel on Climate Change (IPCC).¹⁰ SIDS-related issues raised in the ARs particularly relevant to the Maldives include: (i) vulnerability and impacts would be highly variable but "likely to be greatest where local environments are already under stress as a result of human activities" and would likely affect all sectors including freshwater resources and agriculture (1995 in SAR); (ii) with limited resources and low adaptive capacity, "low-lying islands face the considerable challenge of meeting the social and economic needs of their populations in a manner that is sustainable" (2001, TAR); (iii); in addition to vulnerability and impact studies of SIDS, a broader range of climate change drivers and geographical spread of islands was identified but that the number of "independent scientific studies on climate change and small islands since the TAR" had been quite limited (2007, 4AR); and more recently (iv) initiatives have been identified that will reduce vulnerability and enhance resilience of small islands to ongoing global change including improving risk knowledge and island resource management while also strengthening socioeconomic systems and livelihoods (5AR, 2015).

41. The main CC-related impacts in Maldives are associated with:

Rainfall. Based on Maldives's station data for the period (1975-2010), observed annual rainfall ranged from 1,750 to 2,250 mm. Most of the global predictive models show warming over South Asia to be above the global mean and intense monsoon precipitation will likely to increase while the number of "wet days" is likely to decrease. It is predicted that most of these changes will be associated with increased frequency and intensity of precipitation events, flash-floods and strong winds originating with tropical cyclones. Global climate models (GCMs) predict an increased range in rainfall of 1,250 to 3,185mm.¹¹ Nevertheless, given uncertainties associated

⁷ The most recent development in the waste management sector is the development of a regional waste management facility on R. Vandhoo. This facility covers the four northern atolls and plans to process 52 tons of waste daily for 45 inhabited islands, 15 operational resorts, 15 resorts in development, and nine industrial islands (IDA, 2017).

⁸ A total of 48 tonnes and 81m³ of pesticides were imported in 2013 (MEE, 2015).

⁹ MFMRA,2019.

¹⁰ A 6th AR is currently in preparation.

¹¹ Global climate models (GCMs) are used to make projections for selected climate-change related parameters into the future. There exist a number of different models (e.g., HadCM3, MPI ECHAM 5, MRI CGCM 2.3.2a, GFDL CM2.1A). Projections using data taken for ranges of years from the recent past (e.g., 1961 – 1990) as baseline are typically made

with the downscaling of these models to the national level definitive conclusions concerning future CC-related rainfall events cannot be made with the possible exception of enhanced rainfall during the monsoon season. While there are positive impacts of increasing rainfall on food production, the heavy down pours can also adversely affect food production systems dependent on the commodity;

Temperature. Recent records for near surface temperature¹² in the Maldives show that there is a steady year-to-year increase that may exhibit geographical variations.¹³ For the country as a whole, the projected range of surface air temperature show increases for each of the models' three time slices; i.e., for 2030s (0.87°C to 1.63°C), 2050's (1.19°C to 2.25°C) and 2080's (1.67°C to 3.72°C). While there may be some benefits on commodities production there are also adverse impacts (e.g., increases in numbers and diversification of pests and increased evaporation rates);

Sea level rise. In 1990 a major point highlighted in the IPCC's First Assessment Report (FAR) with respect to SIDS was that a 30- to 50-cm sea-level rise (SLR)¹⁴ projected by 2050 would threaten low islands and a 1-m rise by 2100 "would render some island countries uninhabitable." Projected increases in sea surface height for time slice 2080s over averages recorded for the period 1961 – 1990¹⁵ range between 8.2 and 9.5 cm with an uncertainty range 4.6 to 11.6 cm (Rimes, 2012). SLR can affect soils on which agriculture depends through direct salinization or indirectly through saltwater intrusion of ground water aquifers (MFMRA, 2019); and

Natural disasters and extreme events. A review of past historical records, reports and publications indicates that the Maldives is regularly exposed to the effects of windstorms, heavy rainfall, extreme temperatures and drought, sea swells and storm surges. Model outcomes project increasing risk of drought and floods especially during El Nino events (IPCC, 2001). Tropical cyclones are predicted to be enhanced in intensity by 10 to 20 % (Nurse and Sem 2001). Maximum storm surge height is projected to be 1.32m with a return period of 500 years. If coupled with high tides, it could generate a storm tide of 2.30m (UNDP, 2006). The IPPC assessment also reported the forecasted maximum storm tides for different regions of the Maldives based on medium and high sea level rise scenarios. Based on these assumptions and scenarios, and given that the average height of the Maldives is only 1.5m above mean sea level (MSL), sea level rise would cause regular tidal inundations in most islands even at the medium emission scenario. The high emission scenario could cause inundations recurrently in almost all islands. Storm surges can create up to 2.78 m waves under medium prediction, enough to completely inundate a medium to small sized island in the Maldives. A storm surge at high scenario could cause a 3.18 m wave that could inundate even the largest of islands. These surges do not take into account regular monsoonal wind generated flooding which is considered the most common in Maldives (Shaig, 2006; UNDP, 2006).

Climate change adaptation and mitigation.

42. The following climate adaptation measures have been included in the project design, (i) shifting to thermophilic and drought tolerant crops, (ii) water harvesting combining with

for three different "time-slices" (2030s, 2050s, and 2080s). Projections are also based on different emission level scenarios ranging from low to high. Regional and national projections are "downscaled" from GCM outcomes. In the case of Maldives, the downscaling was carried out by Regional Integrated Multi-Hazard Early Warning System (RIMES). There are increases in uncertainty as GCM outcomes are downscaled and projected further out into the future, in particular when there are few existing data sources and records as in the case of the Maldives.

¹² This is defined as the temperature 2 meters above ground level.

¹³ For example, an assessment of maximum temperatures show an increasing trend in the northern part of the country but a trend in decreasing temperature (-.06°C in the south).

¹⁴ SLR of 1.0 m by 2100 (Special Report on Emission Scenarios (SRES) A1 scenario)

¹⁵ There are only two reporting tide monitoring stations established in the Maldives (Malé and Gan) established in 1989 and 1992, respectively.

increased irrigation efficiencies (e.g., hydroponic schemes and drip irrigation) and (iii) shifting to covered infrastructure (this includes greenhouses and net covered growing platforms that support hydroponic and fertigation schemes contributing to reduced evapotranspiration and increased water use efficiency).

43. At the time of the SECAP RN, there were not sufficient data to be able to estimate the amount of carbon that the project might emit as calculated through the application of the ExAct tool.¹⁶ Nevertheless, from the CN together with the unique characteristics of Maldives and existing agro-ecosystems, the programme is unlikely to result in any significant impacts to/on existing land use (deforestation/re- or afforestation), grassland/livestock systems, forest and peat soil management, existing wetland systems and/or fisheries. There however may be some increase in carbon emissions associated with possible programme-supported changes to perennial cropland systems and increased use of chemical inputs. This may be offset by promotion of more efficient farming practices, the reduced application of nitrogen-based fertilizers, a shift to a more highly productive agriculture (e.g., hydroponics) and promotion of increased use of solar energy systems. It is suggested once programme design is completed a carbon assessment be conducted to assess net balance of carbon emissions.

Target Group Profiles

44. The 2014 census estimates that over 15,000 people are employed in the fisheries and agriculture and sectors accounting for 10 percent of the country's employed population. Data from MFMRA shows that a total of 7,536 farmers are registered at present which represents 573 hectares of farmland. Within the registered farmers 53% are females.

45. Among the registered farmers a typical farmer can be defined as an islander who grows fruits and vegetables in a plot of land allocated for agricultural purposes with the aim of earning income. In almost all islands where land is available plots of land are allocated for agricultural purposes by the Island Council. In some islands farmers grow specialised crops like watermelon in Thoddoo and banana plants in Hdh Vaikaradhoo and Sh Feerah, but in general the small farmer grows multiple crops. Registered and non-registered farmers undertake field agriculture farming. In recent times farmers employ migrant labours to farm on semi commercial or commercial agriculture farms.

46. In addition to registered farmers many islanders, undertake agricultural activities without registering. Taro farming, coconut collecting, and backyard gardening and processing of agriculture products as fried taro, fried breadfruit and fried leaves are some of the other types of agriculture related activities undertaken. Even on islands where other occupations are available, production of agricultural crops as supplementary sources of food and cash income is the norm. As such agriculture is still the principal preoccupation and source of livelihood for a large number of people, particularly on major agricultural islands.

47. With coconut grown extensively throughout the country in homesteads and well as semi commercially and commercially in inhabited islands and uninhabited islands coconut collection is a livelihood activity dominated by women. Coconut palms and all natural vegetation found in the islands can usually tolerate high salinity levels. Coconut are collected from the community forestlands and after collecting the husks are removed and the nut sold locally or sent to Malé. The husks sometimes are used to make rope or used as firewood. Often smaller coconuts are scraped and used to make curry powder together with spices and packed and sold as value added products. By products of the coconut palm are used in a variety of ways in the Maldives such as weaving the leaves for the thatch producing and coconut oil. Coconut leaf thatch is still

¹⁶ The EX-Ante Carbon Balance Tool (EX-ACT) can be found from the FAO website (<http://www.fao.org/tc/exact/ex-act-home/en/>).

used as roofing material on some of the resort islands and this contributes a substantial income for some of the farming islands.

48. In certain islands, especially those in the South where there are low lying swampy areas, the growing of root crops such as taro is important. The low-elevation areas of the island act as a "sink" to the surrounding area and forms a marsh. This area is designated for taro farming and no formal registration is required to plant crops. According to the Gan Island Council, residents can select an area for planting and continue using the land free of charge for any duration. Taro is grown year-round and taro farmers can harvest mature crop from different areas of the field throughout the year. Taro is a local delicacy and always has a market.

49. The programme will directly target all small farmers in the country. These farmers will be the formally registered farmers, non-registered farmers backyard gardening farmers, household-level processors, coconut collectors and taro farmers. Priority will be allocated to women farmers (who constitute 53 percent of farmers) and young farmers. It is estimated that the project will reach the 7,500 registered farmers and another 2,500 unregistered farmers, for a total target population of 10,000 farmers.¹⁷

III. Institutional Analysis

Enabling Environment

50. The Mission found that there was a highly enabling institutional environment that would likely provide substantial support for the project. This includes:

National Fisheries and Agricultural Policy (NFAP). MFMRA in cooperation with FAO prepared the NFAP 2019 – 2029 policy document covering the next 10 years. One of the three pillars of the new policy was ecological resilience, which includes the following objectives: (i) prioritize activities that are environmentally sustainable (e.g., facilitate access to integrated production systems and agro-ecological principles); (ii) increase use of clean energy and improve sustainable use of NR; promote and facilitate access to programs, tools and equipment in support of biodiversity protection and as well as effective control of plants, pests etc; and (iii) promote use of technologies and infrastructure that can increase access to clean water including efficient irrigation systems; and promote and facilitate implementation of ecologically friendly and resiliant production systems (e.g, on-site compost and biofertilizers and equipment and technologies and tools that manage CC effects defined by increase temperatures and greater frequency of droughts). At present there are two separate bills on agriculture and pesticides that were submitted to the current Parliament session that are reflected in the CN;

Strategic Action Plan (SAP). Under Maldives 2019 SAP for the period 2019 – 2023 the Plan presents 5 priority sectors. Under the Blue Economy sector agriculture is identified as one of the subsectors. MAP is in conformity through supporting the following priorities: (i) to introduce M-GAP certification for commercial agricultural producers and small-scale farmers to: (ii) improve stands or production and quality (SAP Strategy 1.4), (iii) enforce IPM practices in agricultural systems, (iv) develop suitable composting systems and support home-based hydroponic systems in selected islands and incorporate CC and sustainable agricultural principles

¹⁷ The SECAP Mission felt these may be over-estimates. This view was based on interviews in the field with the commercial agricultural project manager and the agricultural research station director, respectively who suggested that only 2 to 3 atolls and their respective islands were realistic to be reached by collection boats for agricultural produce on a weekly basis and provision of support by a single extension officers, respectively. Based on those suggestions and an assumption that the number of islands supported by the project would be 5 islands per atoll and 3 atolls in the north and south regions would result in a total of 30 islands (2 regions x 3 atolls x 5 islands) or 15 % of total small-farmer islands (197). Either the target would have to be reduced or investment increased and/or the assumptions changed to meet CN targets.

in all training and research activities (Strategies 4.4 and 4.5, respectively). Relevant and targets to be achieved by 2023 are: (i) IPM guidelines to be fully implemented in at least 50 agricultural islands and at least 20 % of commercial areas are M-GAP certified. Other sectoral strategies and plans that MAP is in conformity with include: (i) Climate Change Policy Framework (MEE, 2015); (ii) Maldives National Chemical Profile (MEE, 2015); (iii) National Biodiversity Strategy and Action Plan 2016 – 2025 (MEE, 2015); and (iv) the Adaptation Program of Action (MEEW, 2007);

National Spatial Plan (NSP). The NSP 2020-2040 is a government initiative to promote decentralized development through connectivity and accessibility. NSP is the country's first strategic spatial development framework and will serve as a policy document for directing and informing national and regional resource allocation and distribution. This Plan will serve as a framework to integrate service accessibility and resource efficiency with the establishment of a National Transportation Network (NTN). This Plan which broadly integrates the national and international commitments of the country, will especially support the timely delivery of the Jazeera Raajje Manifesto, 8th National Development Plan (NDP) underway and the Sustainable Development Goals (SDGs) of Global Agenda 2030. The varying orders of regions are distributed from north to south of the country to foster a more equitable distribution of socio-economic benefits for the population. The Regions are mainly classified into Urban Regions, Satellite Regions and Satellite Island(s) of which there is a total of 21. An integrated transportation network coupled with strategic distribution of key services and infrastructure between the islands is intended to enable the collective functionality of the NSP regions. NSP defines the national service allocations and the allocations made for each NSP Region.¹⁸ At this stage, national level services and those allocated for the Urban Regions PI, PII and Satellite Regions have been determined. with the level of service depending on the size of the target servicing population. While about 68 services have been allocated for Urban Regions, 24 services are allocated for Satellite Regions. Satellite Clusters are connected with the services of Urban Regions through direct marine transport links. Regional agricultural services (agri-centers, nurseries, urban agricultural centers and uninhabited agricultural islands will be supported for Urban Regions I and II. Service islands have already been identified to provide agricultural services for the other non-urban regions. NSP will be implemented in four quarters with a 5 year timeframe, each. Priorities for the next three years are: (i) design of domestic maritime transport system (2019), (ii) initiation of provision of maritime services (2020) and (iii) completion of airport transport infrastructure (2021); and

United Nations Development Assistance Framework (UNDAF). MAP also supports the UNDAF for the period 2016 -2020 that has two relevant strategic priorities, gender (priority area 2) and environment/climate change (priority area 4) including promoting increasing resilience to CC (Outcome 4).

Gender.

51. The Maldives ranks 101st of 164 countries rated by the Gender Development Index (2017), 106th of 144 countries rated by the Gender Gap Index (2017), and 76th of 160 countries rated by the Gender Inequality Index. These rankings confirm that much needs to be done to improve women's empowerment and their access to services and opportunities. Furthermore, women's participation in the labour force, at only 48% in 2014, is very low. There are 3,992 registered women farmers that accounts for 53% of all registered farmers, indicating that there is no gender disparity in allocating arable land. The general practise is for Island Councils to allocate land to community members who apply for farming. In the agriculture sector, gender

¹⁸ Examples of key service allocations at the national level include trans-shipment port, cruise terminal, arts and culture centre and national data centre. Some of the key regional level service allocations include international/domestic airports, waste management centres, central ferry terminal, reserves including that of water, fuel and food, etc.

division across roles exists; generally women contribute to crop production, value addition and natural resource management. Women often assist men in farming activities, while some are also fully engaged in related value-added activities. Selling produce is considered a male responsibility. Although gender roles are largely fixed in agriculture and fisheries, as modernisation brings changes to the island way of life some women are taking up the tasks traditionally performed by men as the need arises. The Government has taken several measures to improve gender equality, most importantly through ratification of the Gender Equality Act in 2017. This Act defines the role of the Government, political parties and businesses in bridging gender gaps in the political, economic and social aspects of life. Its enforcement is governed by a set of regulations to eliminate gender-based violence, combat discrimination and sexual harassment, provide equal opportunity and equal pay, and enhance women's participation in the labour force.

EIA Requirements.

52. The Government of Maldives (GoM) has a number of environmental policies, regulations and standards of specific relevance to environmental protection. The main legal instrument is the Environmental Protection and Preservation Act (Law No. 4/93) of the Maldives. This Act provides the Environmental Protection Agency (EPA), an autonomous agency within the Ministry of Environment and Energy (MEE), with wide statutory powers pertaining to environmental regulation and enforcement. In addition, the GoM also enforces the Environmental Impact Assessment (EIA) Regulations, which came into force in May 2007, as per the statutory requirements of the EPA. According to existing EIA guidelines all agricultural projects qualify for Schedule D which means that MFMRA will need to submit a project brief for consideration in a scoping meeting subsequent to which either an IEE or EIA report may be required.¹⁹

53. Relevant on-going public programs and potential collaborative partners include:

Waste Management and Pollution Control Department (MMD). The WMD in the MEE is mandated to ensure the proper implementation of the regulations. This regulation sets standards for the management of municipal, industrial and special waste, issuance of permissions in relation to waste management, transportation of waste, information sharing/reporting and penalizing for non-compliance. The EPA has also developed Waste Incineration Guidelines (WIGs), published in 2016, which are intended to facilitate the construction and operation of waste incinerators safely and to mitigate the adverse environmental and health impacts that may arise during the set up and operational cycle.²⁰ The National Solid Waste Management Policy was formulated in 2008 and a Waste Management Regulation was enacted in 2013. National Solid Waste Management Policy was further revised in 2015. Under these policies waste management centers at islands, regional waste management facilities, systematic waste collection mechanisms and pilot waste to energy projects are being implemented. This policy is currently being supported by three on-going solid waste programs supported by the IDA (Maldives Clean Environment Project), AsDB (Greater Malé Environmental Improvement and Waste Management Project) and Abu Dahbi Fund (Small Scale Waste to Energy for Addu, R. Vandhoo and H.Dh Clusters Project). Of particular interest is the IDA-supported project that will be establishing regional and island integrated waste management plans and systems in Zones II, IV and V;

Water and Sanitation Department (WSD). The WSD in MEE is responsible for the Ministry's mandatory function to provide safe water and sustainable, affordable, and environmentally-friendly sewerage systems in the Maldives. The department is tasked with developing policies

¹⁹ There is a registry of EPA-approved consultants to conduct the EIA. The process averages a month. EPA has suggested that this should be done only once the specific islands to receive project support are known. It was also noted that if there will be significant changes in land use approval from the Planning Ministry may also be a requirement.

²⁰ The WIGs present the minimal standards to be maintained and precautions to be undertaken during waste incineration. The EPA is responsible to ensure sound adherence to the standards.

and regulations, facilitating and coordinating the mobilization and use of resources for water and sewage systems. The department provides advice to both the government and the private sector in the planning and implementation of water and sanitation programs and in the provision and usage of such services. These mandates are currently being supported by a GCF-funded, UNDP assisted project (Support of Vulnerable Communities in Maldives to Manage Climate Change-Induced Water Shortages) that will scale-up an integrated water supply system based on rainwater, groundwater and desalinated water into a low-cost delivery system for vulnerable households. Originally targeting 49 islands (this has subsequently been reduced to 29 islands) that currently rely on emergency water deliveries for three months of each year. Of particular interest to MAP is a focus on groundwater quality improved for long-term resilience. Groundwater recharge systems and improved water resource management capacity will contribute to improved groundwater quality;

Climate Change Department (CCD). The CCD in MEE is in charge of formulating policies and standards to address CC's challenges in line with the legislative framework of the ROM as well as international practices and conventions. Of particular relevance to MAP are the following mandates: (i) bolstering adaptation actions and opportunities, building climate-resilient infrastructure and communities and (ii) fostering sustainable development while ensuring security, economic sustainability and sovereignty from the negative consequences of the changing climate;

Maldives Food and Drug Authority (MFDA) The MFDA, together with the Agriculture Division of MOFA, has prepared Good Agriculture Practices (GAP) standards for fruits and vegetables, with the technical assistant from a National Food Safety Policy 2017-2026 consultant under FAO support, by adopting those of SAARC-GAP as the voluntary standard for safe agricultural production. The draft is currently under revision according to the country's context by the technical committee which includes key stakeholders. GAP certification is also proposed to be the responsibility of the MFDA. The MFDA, as well as other MOH agencies, has delegated food safety related tasks to the public health units at atoll and island levels; and

Maldives Meteorological Service (MMS). There are 5 meteorological offices under MMS, the station in Hulhule' being the main office. Aviation and synoptic observations are supported in the other four stations (Hanimaadhoo, Laamu Kadhdhoo, Gaaf Dhaal Kaadedhdhoo and Seenu Gan). In addition to these stations, there are 20 automated weather stations and 3 tide gauges installed across the country which provide real time data to MMS.

Potential Sources of Additional Funding.

54. The main international financing institutions in the 2016 – 2017 period in order of resources were: the AsDB (US \$ 11.5), JICA (US \$ 6.8 M) and the WB/IDA (US\$ 6.2). In terms of sectors infrastructure (60% of total assistance received) followed by other social infrastructure (21 %), multi-sector (9 %), production (6%). and education (5 %) were the most important.²¹ In terms of environmental projects (including climate change activities) the main funding sources and on-going projects identified were: (i) the GEF-funded eliminating POPs and chemical waste (UNDP/MEEW) approved in 2017; (ii) the Maldives Clean Environment Project (IDA/MCEP); (iii) the Greater Malé Environmental Improvement and Waste Management Project (AsDB/MOEEW) and the Sustainable Fisheries Resource Development Project (IDA/MFMRA). There was also a recently completed policy-oriented technical assistance project (FAO) in support of MFMRA resulting in the National Fisheries and Agricultural Policy 2019 – 2029 . Maldives is also receiving assistance through SAARC in support of sustainable agriculture.

²¹ Source: OECD: Aid at a glance (<http://www.oecd.org>).

55. The international NGO community has a small presence and only IUCN was identified working in the fisheries sector.

56. Maldives has recently “graduated” from and is no longer qualified for LDCF/SCCF funding.

57. Under GEF 6 there is still unprogrammed residual funding of approximately US \$ 2.4 M left for CC and LD Focal Areas (FA) as the BD FA was heavily oversubscribed from the initial allocation however these funds while not formerly committed, appear to be “earmarked” for another GEF IA/EA.²² Similarly under GEF 7, despite the presence of at least 3 programs that appear to be of particular relevance to Maldives in support of sustainable agriculture, Maldives allocation appears to already be “ringfenced” and no longer available.²³

58. FAO is currently working with MFMRA together with UNDP in the development of a GCF proposal targeting both agricultural and fisheries sectors.

IV. Environmental and Social Category

59. The Project is classified as environmental and social Category B because the project activities entail (i) development of agro-processing facilities; (ii) agricultural intensification and/or expansion of cropping area in non-sensitive areas, and (iii) credit operations through financial service providers will likely have adverse environmental impacts on habitats, ecosystems and/or livelihoods that are site-specific and can be mitigated by known measures included in the ESMP.

60. Similarly, MAP appears to meet the following social criteria typical of a category B project: (i) agricultural intensification and/or expansion of cropping area in non-sensitive areas that may have adverse impacts on habitats, ecosystems and/or livelihoods; (ii) short-term public health and safety concerns and (iii) requiring a migrant workforce or seasonal workers (for construction, planting and/or harvesting).

61. The SECAP RN confirms this risk category and mitigation measures have been recommended in the ESMP (Section VI).

V. Climate Risk Category

62. At the time of the preparation of the CN the IFAD team, despite recognizing the Maldives high vulnerability to the impacts of climate change, rated the project risk as Moderate. This was based on the view that the project is well-positioned to leverage ongoing climate change-related initiatives in the area. Following IFAD’s climate risk screening criteria the November SECAP mission recommended a recategorized as High risk and the preparation of a detailed climate vulnerability assessment (CVA). This recommendation did not conflict with the earlier CN mission’s proposal that given the multitude of existing studies the CVA could be prepared using existing climate risk analyses. A Climate Risk Analysis (CRA) was completed and has been submitted to IFAD.

²² Source: GEF website.

²³ These are: (i) Least Developing Countries and Small Island Developing States Program under the Chemicals and Waste FA (Program 3) that will seek to address the sound management of chemicals and waste through strengthening the capacity of sub-national, national and regional institutions and strengthening the enabling policy and regulatory framework in these countries; (ii) Objective 1 under the IW FA, Strengthening Blue Economy concept, opportunities will be identified in coastal areas for potential sustainable development of existing and new sectors, including agriculture (e.g., run-off from agricultural lands); and (iii) GEF’s impact program 1, Food Systems, Land Use and Restoration in support of an integrated approach to implementing SLM to increase the prospects for food security for smallholders and communities that are dependent on farming for their livelihoods.

VI. Recommendations for Project Design and Implementation

63. Seven recommendations for consideration in programme design are provided below:

Data. Lack of data is one of the major obstacles confronted by the agriculture sector. Currently statistics on production of agriculture are almost non-existent. Reliable and up to date information are basic fundamentals in agriculture development from the design and implementation stage and can impact the sustainability of the project. Data presented in the 2014 Census is aggregated with the fisheries sector. Taking into consideration the agricultural sector's importance there is a need to disaggregate both sectors to support evidence based decisions. MFMRA needs to coordinate with National Bureau of Statistics (NBS) to disaggregate the sector specific data. To support IFAD's mainstreaming priorities agriculture data will need to be segregated by sector, sex youth and nutritional status. Reliable and up-to-date information and data are basic and fundamental element in agricultural development as these can impact decisions taken and relates to the sustainability and the productivity of the programme. This should be reflected in a robust M&E sub-component supported under Component 4;

Gender. Women are important actors in achieving food security and improved nutrition. As a result increased emphasis should be given to focusing on women, especially disadvantaged women, to help their survival and efficiency in livelihood activities. The low participation of women in the labour force indicates women need support in productive economic activities, including improved access to financing and investment, technology, infrastructure, training and diverse markets. In MAP's design stage emphasis should be made to provide woman farmers, especially the disadvantaged women such as women in female-headed households, equal access to markets, along with supporting resources and capacity building;

Farm Labour. Due to the influx of migrants into the labour force, the changing makeup of the agriculture sector needs to be taken into consideration to deal with challenges related to it. Census 2014 reports that of the total population employed in the fisheries and agriculture sectors, 8 percent are foreign residents. It is well known fact that migrant workers also contribute to the sectors informally, which is not reflected in the data. Today often Malé migrant workers are actively involved in production and in some islands it is common for migrant workers to informally rent agricultural fields from locals. In other cases the local owner owns the farm while the migrant worker manages the farming activities including the use of agrochemicals. The migrant workers lack information on good practices and misuse of chemical pesticides as no training is provided to migrant workers. This aspect needs to be discussed with MFMRA and at least for MAP, M-GAP training should target all farmers;

M-GAP. To integrate Good Agriculture Practices (GAP) standards, MFMRA is introducing M-GAP certification for commercial agricultural producers and small scale farmers to improve the standards of the quality of the produce. Key Informant Interviews undertaken during the SECAP Mission indicate that it would be more realistic to implement M-GAP measures gradually through a series of phases based on the GAP's 5 modules, in particular for the small farmer. It should also be noted that M-GAP certification remains voluntary and lacks a supporting regulatory framework as the supporting pesticides bill submitted to the Legal Office some three years ago has yet to move forward;

Mitigation Measures. As noted above, lack of site-specificity and detailed project interventions has constrained the SECAP analysis. Nevertheless, the listed impacts fall mainly under MAP's second component and to a lesser extent under components one and two. No impacts were identified under the management component (component 4). Information was provided for reference purposes for the design team on EIA requirements (Attachment 2). In addition

information has been provided on approved and banned pesticides in the Maldives, list of protected areas and selected criteria for M-GAP certification and can be found in the project file;

Island-specific Integrative Frameworks. The programme is likely to find in the island selection and assessment process of candidate islands that each are unique. Variables include for example: (i) degree of farming as economic activity and presence of markets, (ii) inter-relationships between farmers and coconut collectors and access to the latter, (iii) environmental constraints (quality of groundwater and access to alternatives), (iv) distance from off-island markets, (v) capacity of the island council, (v) availability and characteristics of labor inputs, (vi) presence of other on-going projects that, due to the size and nature of these small islands, should be collaborative activities integrated with MAP-supported activities. Overlaying this is the status of a number of relevant national programs described in section 3 above. It is suggested that island-specific diagnostic profiles²⁴ be prepared to guide interventions supported by the project in each island and identify where collaborative interventions can be supported in particular with the solid waste, integrative water management efforts and CC adaptation interventions.²⁵ Due to the stalled regulatory framework it would appear that M-GAP will remain a voluntary scheme for the present. This has been discussed in further detail in the Environment Social Management Framework (ESMF) prepared for MAP; and

Agro-chemical Analyses. One of the project activities will be to support the rolling out of M-GAP practices among farmers leading to certification in the production of low-impact and health produce. A critical factor will be mastering the use and application of approved agro-chemicals. Part of the certification process involves establishing baseline conditions and follow-up monitoring. A review of information supported with interviews would seem to support the conclusion that few to no data exist. This is a major constraint to both achieving M-GAP objectives and implementing proposed SECAP mitigation measures. It is understood that MAP will support the purchase of and training in of a High Performance Liquid Chromatograph (HPLC) for use by ARC. This will represent a significant step in addressing this important gap in water quality data.

VII. Further Studies Needed

59. **Project-related Carbon Emission Assessment.** It is suggested that once project design is completed a carbon assessment be conducted through the application of the ExAct to assess net balance of carbon emissions per IFAD SECAP requirements.

VIII. Monitoring and Evaluation

60. Indicators suggested for consideration for inclusion in MAP's Results Framework and M&E system in line with the proposed project activities are presented below (Table 1).

Table 1. List of Recommended Monitoring Indicators for Maldives Agricultural programme (MAP)

²⁴ For purposes of the ESMF public consultation, environmental/social impact mitigation and M&E it is recommended that each island be "treated" as a "subproject." Based on initial consultations with the island chief, council and farmers there will be a better understanding of what will be the likely "package" of interventions proposed for MAP-support. In parallel to this process and critical to informing the selection of activities to be included in the "package", baseline conditions for each island should be established and presented in the form of a diagnostic profile (see Attachment 5 of the ESMF Framework). The baseline, results of public consultation and proposed MAP activities would provide the basis for screening, and if needed, flagging follow-up activities to address data gaps and the identification of site-specific mitigation measures and in those rare instances, when a detailed EIA may be required.

²⁵ One example of the potential benefits derived from a collaborative activity would be between WMD (MEE) and DOA (MFMRA) where the former is working with farmers to dispose of their vegetative matter but don't have the expertise of the latter to assist them in its use in making and applying compost.

Activity	Suggested Monitoring Indicators
water-harvesting	- reductions in offtake from aquifer through bore holes (mt ³)
lining irrigation canals (TBD)	- increase in water use efficiency (%) - changes in aquifer levels (meters) and usage (mt ³)
agricultural inputs	- uptake of pest resistant seed varieties and use of IPM practices (#/type of practices adopted) - reduction of use of agro-chemicals in programme areas(decrease in volume from baseline by class) - groundwater quality (presence and concentration of selected pesticides and fertilizers)
land-levelling (TBD)	- increase in water use efficiency (%)
production facilities (construction and processes)	- for "greenfield" sites, inspection to ensure new facility is appropriate for designated land use (# and compliance with EIA requirements) - presence and concentrations of selected pollutants at "end of pipe" discharge of facilities/processes supported under the project - development and adoption of improved recycling and/or safe waste disposal technologies (#) - increase in recycling efficiency (%)
promote adoption of sustainable certification schemes	- functioning pilot certification schemes (#) - premium paid for certified products over baseline (MDV)
"bankable" business plans	- development and application of environmental guidelines incorporated into the plans
capacity building	- events (#) people trained (per-time) in climate change and environmental impact mitigation
increasing public awareness (PA)	- events (#) and people (#) participating in climate change oriented PA activities

57. For MAP, the PIU will be responsible for the establishment of the M&E system, organising the project baseline and undertaking activity monitoring and supervision. At the atoll and island levels it will be responsible for undertaking M&E and reporting. Third party monitoring and evaluation will also be considered for MAP either at national or at local levels.

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Attachment 1: ESMP Plan and Matrix¹

Environmental / Social and climate Impacts	Recommended Mitigation/Enhancement measures	Public Consultation Activities	Responsible Institution in Implementation Phase	Means of Verification (Monitoring and reporting)	Frequency of Verification	Cost Estimate
- MAP training and capacity building activities fail to reach migrant workers in agricultural sector	- incorporate migrant workers as one of target groups into project design	- island council - farmers fora	MFMRA/PIU	- documentation of participation in relevant MAP supported training activities	- by event and reported in MAP's M&E system	- costed in existing project design
- groundwater extraction increased due to intensification of agricultural production through shift to HY varieties - reduction in aquifer recharge due to increased water harvesting, construction of non-permeable slabs associated with project supported construction and lining of existing irrigation canals)	- conduct water assessments in drought prone islands; - increase project supported water harvesting investments; - use of permeable construction slabs - identify/enlarge/protect recharge areas (catchment areas); and - if needed, offset reduced recharge rates with reductions in less important extraction activities.	- island council - island water users (if present)	MFMRA/PIU MEE (WSD)	- government inspections/private contractor monitoring reports	- bi-annual (wet & dry season)	71,600 ²
- groundwater quality not suitable for agricultural use	- establish baseline and periodic monitoring where MAP supports groundwater extraction	- island council - island water users (if present)	MFMRA/PIU ARC MEE (WSD) MEE (EPA) MOH MFDA)	M&E monitoring reports	- bi-annual (wet & dry season)	- costed in project design (infrastructure/equipment for ARC)

Annex 5. Maldives Agribusiness programme:
 Social Environment and Climate Assessment
 Procedures (SECAP) and Review Note

- agro-chemical use and disposal (intensification of agricultural production through shift to HY varieties and rolling out of hydroponic schemes and application of drip fertigation)	- application of existing policies on banned agro-chemicals; - promote shift towards organic fertilizers using tax policies in compliance with draft agro-chemical bill and M-GAP certification criteria; - provision of support for pest resistant seed varieties; and - support for IPM	- island council - farmer fora	MFMRA MEE (WSD) MEE (EPA) MOH MFDA)	- government inspections/private contractor; monitoring reports; chemical analyses	Initially monthly (when cleaning closed systems and disposing residues on field crops) with reduced frequency when SOP In place	- costed in project design (infrastructure/equipment for ARC)
- temporary loss of vegetative cover and exposure of soils to precipitation and possible increase in coastal / nearshore sedimentation (land preparation including leveling, seeding and weeding; infrastructure construction including research facilities, hydroponic structures, greenhouses, storage / processing / packaging and market facilities)	- application of existing EPA/EIA environmental standards for land clearing; - limit construction to dry season; and - use of silt curtains.	- island council	MFMRA MEE (EPA)	- government inspections/private contractor monitoring reports	3 visits per activity (pre, on-going and post project)	- see FN 2
- production of various by-products and organic pollution (associated with the respective processing of commodities such as coconut chips, and UHT coconut water, pickles, jam and juice)	- incorporation of effluent treatment and disposal technology in process design -compliance with existing EPA/EIA WQ standards and regulations	- island council	MFMRA MEE (EPA) MEE (WSD)	- government inspections/private contractor assessment reports	Initial on-site assessment followed by ad hoc, unannounced site visits	53,760 ⁷

Annex 5. Maldives Agribusiness programme:
 Social Environment and Climate Assessment
 Procedures (SECAP) and Review Note

- increase in solid waste (packaging from inputs and for by-product production)	- improved recycling and/or safe disposal of waste per existing policies on solid wastes	- island council	MFMRA MEE (EPA) MEE (WSD)	- government inspections/private contractor; assessment reports	Initial on-site assessment followed by ad hoc, unannounced site visits	- costed under M&E sub-component
- "bankable" business plans and loans support adverse activities not in compliance with GOM/IFAD policies (development of "bankable" business plans)	- provision of guidelines for borrower and financing institutions complemented by training ensuring loan resources support activities that are environmentally sustainable, climate change friendly and in compliance with government EPA EIA requirements	- island council - SME - farmers fora	- MFMRA - MEE (EPA) - SDFC - MFLC - PIU business development specialist	- guidelines - bank approval documentation	- on demand	- costed in project under component 2
- MAP supported infrastructure (new and reformed) and equipment at risk to the effects of storm/tidal surge and ensuing flooding from extreme events	- flood proofing	- island council	- MFMRA - MHI	- construction site inspection - insurance policy	- periodicity define in insurance policy	- costed in project design and covered in MAP construction costs
- adverse CC effects on agricultural production	- policy study on feasibility of offering indexed hazard insurance for small farmers	- farmers fora	- MFMRA	- policy study	- NA	- costed in project design

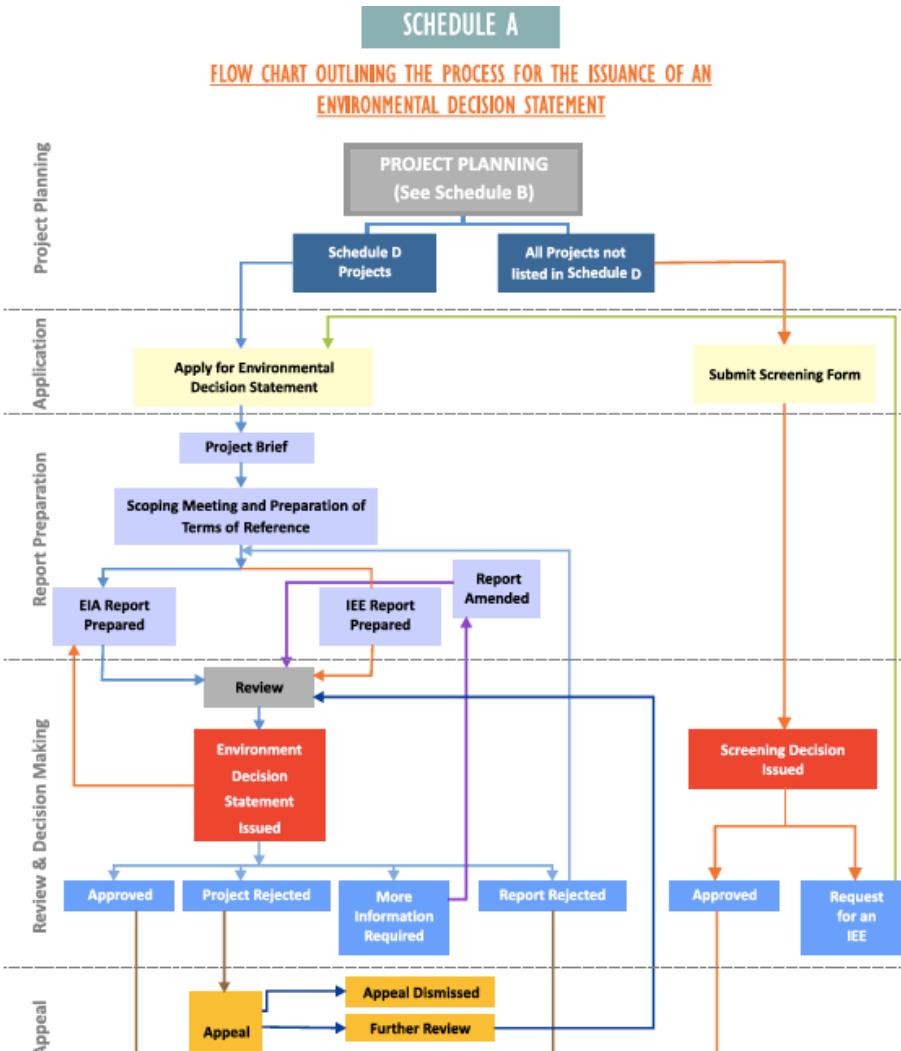
¹ The ESMP matrix must be integrated into the project's implementation manual or developed as a stand-alone guidance document for the project management unit late in the design stage. The following templates must be attached to all SECAP review notes of Cat B projects.

² This consists of [one person day (technician) + 1 rt air trip (Malé – island A) + one boat rental covering 3 islands, ground transport] x 5 trips x 2 per season x 4 years

Key (US\$):

Technician person-day: 200
 Place ticket (rt): 150
 1 day DSA: 70
 Boat rental (day): 670
 Taxi (6 hours): 300

Attachment 2. EIA Process for Schedule D Projects



Attachment 3. List of Documents in the Project File*

Approved and Banned Pesticides (2019). Source: MFMRA

Banned Pesticide List. Source: MFMRA

List of Protected Areas (2019). Source: EPA¹

Draft TORs for a Detailed Climate Risk Analysis for MAP

Selected Criteria for M-GAP Certification. Source: MAMRF/MFSA, 2015.

M-GAP Logo

*submitted with the Draft SECAP & RN in November 2019.

Maldives Agriculture Programme (MAP)

Environmental Social Management Framework (ESMF)

I. Introduction

1. The Government of the Maldives (GOM) has requested the International Fund for Agriculture Development (IFAD) to provide financial assistance for the national Maldives Agriculture Programme (MAP). The MAP will include physical investments in infrastructure (new and rehabilitation of existing infrastructure including research facilities, greenhouses and storage facilities), equipment, chemical inputs, rain harvesting and storage technology and small-scale agriculture processing facilities). Non-physical investments will contribute to policy refinement, strengthened services and institutions, enhanced agricultural technologies and better access to financing and markets for small farmer households. The Ministry of Fisheries, Marine Resources and Agriculture (MFMRA) will be the Implementing Agency (IA) for MAP.
2. The main purpose of an ESMF is to:
 - Establish clear procedures and methodologies for the environmental and social assessment, review, approval and implementation of investments to be financed under the project
 - Specify appropriate roles and responsibilities, and outline the necessary reporting procedures, for managing and monitoring environmental and social concerns related to project investments
 - Determine the training, capacity building and technical assistance needed to successfully implement the provisions of the ESMF, and
 - Provide practical information resources for implementing the ESMF.

This Environmental Social Management Framework (ESMF) is applicable to physical interventions implemented in islands that have yet to be identified at the time of programme appraisal. The ESMF outlines the policy, procedures, and institutional requirements for preparing the island-specific interventions. These activities will be processed following IFAD's SECAP procedures (IFAD, 2014), which is also incorporated in this document. MFMRA is responsible for preparing the required environmental assessments and obtaining IFAD concurrence.

II. General Provisions

Policy and Legal Requirements

3. Government of Maldives. The Government of Maldives (GoM) has a number of environmental policies, regulations and standards of specific relevance to environmental protection. The main legal instrument is the Environmental Protection and Preservation Act (Law No. 4/93) of the Maldives. This Act provides the Environmental Protection Agency (EPA), an autonomous agency within the Ministry of Environment and Energy (MEE), with wide statutory powers pertaining to environmental regulation and enforcement. In addition, the GoM also enforces the Environmental Impact Assessment (EIA) Regulations, which came into force in May 2007, as per the statutory requirements of the EPA (MEE, 2007).
4. The existing regulations reflect a process that is consistent with international norms. EIA requirements differ for proposed projects dependent on the characteristics of the location of the project interventions and nature and magnitude of proposed activities. Initially, screening requires that proposed projects be classified based on whether they are found on Schedule D (see Attachment 1).²⁶ In the case of not being found on the Schedule D list, a submission of a screening form is required subsequent to which a decision is issued either to proceed with the project or in some cases require an Initial Environmental Examination (IEE).
5. Schedule D projects require the submission of an EIA/IEE application form (Schedule C2) together with a project brief not to exceed three pages requesting an environmental decision statement (Attachment 2). In the follow-up scoping meeting, a decision is taken whether an IEE or EIA report will be required. Other options include rejecting the application or calling for more information. According to existing guidelines all agricultural projects qualify for Schedule D listing (Attachment 3). It appears likely that MAP would qualify for as a Schedule D project.

²⁶ These are similar to C type projects under the IFAD classification characterized by positive or no impact on the environment.

6. Criteria applied to assess whether an IEE or an EIA is required depend on the effects of the development proposal on the following factors: (i) fauna and flora, and living components of the environment; (ii) soil, water, air, climate, the landscape, and the non-living components of the environment; (iii) the interaction between these factors; (iv) material assets and cultural heritage; (v) impacts on the project from the environment; and (vi) human interactions and their interactions with the factors mentioned in paragraphs above.

7. Finally, it should be noted that there is a registry of EPA-approved consultants to conduct the EIA. The process in general averages a month. It was also noted that if there will be significant changes in land use approval from the Planning Ministry may also be a requirement.

8. IFAD. The goal of IFAD's Environment, Natural Resources Management (ENRM) policy is to enable poor rural people to escape from and remain out of poverty through more-productive and resilient livelihoods and ecosystems. The purpose is to integrate the sustainable management of natural assets across the activities of IFAD and its partners. The policy sets out 10 core principles to guide IFAD's support for clients in ENRM. The principles include both the core issues to be addressed and suggested approaches. In summary, IFAD will promote:

- scaled-up investment in multiple- benefit approaches for sustainable agricultural intensification;
- recognition and greater awareness of the economic, social and cultural value of natural assets;
- 'climate-smart' approaches to rural development;
- greater attention to risk and resilience in order to manage environment- and natural-resource-related shocks;
- engagement in value chains to drive green growth;
- improved governance of natural assets for poor rural people by strengthening land tenure and community-led empowerment;
- livelihood diversification to reduce vulnerability and build resilience for sustainable natural resource management;
- equality and empowerment for women and indigenous peoples in managing natural resources;
- increased access by poor rural communities to environment and climate finance; and
- environmental commitment through changing its own behaviour.

9. Since its approval by IFAD's board in 2011 the policy is being implemented through a systematic integration into IFAD's portfolio focusing on:

- operations and its systematic integration in the project cycle;
- in promoting knowledge, advocacy and partnerships through promoting integration across communities of practice, including through South-South exchanges and farmer-to-farmer learning;
- resource mobilization, and supporting the integration of environmentally sound; and 'climate-smart' practices across IFAD's lending portfolio;
- promoting increased staff skills and internal capacity and procedures; and
- embeding ENRM-related issues across IFAD's results-based measurement system.

10. A key tool to promoting the integration of the ENRM principles into the project cycle has been the development of IFAD's Social, Environment and Climate Assessment Procedures (SECAP). These procedures were designed to enable IFAD to (i) improve its decision-making and promote the sustainability of project outcomes, (ii) ensure greater harmonization with similar procedures of other multilateral financial institutions and with its own environment and NRM policy and climate change strategy; and (iii) continue to access environmental and climate financing such as the Global Environmental Facility and the Green Climate Fund. MAP's SECAP is discussed in more detail below.

III. Anticipated Environmental Impacts

Description of the Project

11. The **goal** of the Maldives Agriculture Programme's is to sustainably increase the incomes, food security and nutritional status of small farmer households. MAP's **development objective** is to strengthen the enabling environment for sustainable and climate-resilient agriculture. This objective will be achieved through policy refinement, strengthened services and institutions, enhanced agricultural technologies and better access to financing and markets for small farmer households.

12. The Programme will support the agribusiness development in Maldives by investing in the generation and transfer of climate-smart technologies of modern agriculture, which are tailored to respond to the needs of agricultural production enhanced to meet with the identified market opportunities. This will

be achieved through activities supported under **three technical components**: (i) enabling policy, institutions and services (component 1); (ii) climate-smart production (component 2); and (iii) market connection (component 3). MAP will be supported by a 4th programme management component.

13. Activities supported under Component 1 include: (i) providing support to establish policies (research, studies, strategies and bylaws); (ii) strengthening institutional capacity of the Ministry of Fisheries, Marine Resources and Agriculture (MOFMRA) and its Agriculture Research Centre (ARC) located in Hanimadhu Island. In the latter case this includes support for new facilities (e.g., laboratory, greenhouses), systems (vertical production, hydroponic, drip fertigation) and related equipment (e.g., water quality and tissue sampling equipment and reagents, grafting and photovoltaic); and (iii) support to MOFMRA/MED for the soon to be established Maldives Agriculture Corporation (MACO) in the form of training the Corporation's staff and subsequent provision of agricultural inputs and equipment to promote the adoption of new production systems among the smallholder farmers, and disseminating Maldives Good Agricultural Practices (MGAP) in conjunction with sustainable, climate-smart informed input management. Main expected outputs are: (i) policy knowledge products on sustainable and climate-resilient agriculture; (ii) upgraded capability to generate knowledge and technology; (iii) packages of recommendations developed for enhancing economic return for small holder farmers; (iv) new technologies and improved inputs transferred to smallholder farmers; and (v) establishment of an Agriculture Information and Communication Technology (AICT) Service.

14. Following the training and transfer activities supported under component 1, MAP's second component will support the rolling out of services in support of climate-smart production of high value commodities for farmers using inputs supplied by MACO based on the seeds and technologies/production packages developed and validated by ARC with agricultural financing provided from Small and Medium Enterprise Development Finance Corporation (SDFC) and the Maldives Finance Leasing Company (MFLC). The main outputs will be: (i) beneficiaries trained on production practices and technologies; (ii) farmer production forums organized in order to provide required quantity and quality of products in response to the market opportunities; and (iii) improved access to agriculture financing.

15. Activities supported under the Programme's 3rd component will invest in supporting market connections through providing support for market linkage arrangements, matching grants to help establish cold storage facilities in the three programme island hubs, regional hubs and sub-regional hubs, support to cargo vessels for upgrading cold storage in exchange of agreed transport services, and possibly for purchase of refrigerated cargo vessels on a Hire-Purchase basis. The main output will be the establishment of supply contracts between producers and private companies.

16. The MAP's **target groups** are small farmers consisting of men, women and youth belonging to households of different socio-economic categories. Small farmers who depend mainly on agriculture for their livelihood are economically one of the most vulnerable groups in the country. Women and youth continue to be important proportions of the active labour force in agriculture; they are also important actors in achieving food security and improved nutrition.

Environmental Impacts.

17. In light of MAP's focus on developing and promoting the adoption of sustainable, climate-smart technologies reflective of the latest thinking in Good Agricultural Practices (GAP) but adapted to the local needs and characteristics of the Maldives, it is clear that most of the Programme's activities will either result in positive (or at very worse neutral) environmental and social impacts. Nevertheless, some potential adverse social and environmental impacts were identified. While most of these will be minimal and site-specific, the size and fragility of the small island ecosystems characteristic of the Maldives require that they be addressed in a robust manner through carefully designed and targeted mitigation measures. A relative comparison between IFAD and EPA and likely results from the screening of programme activities is presented in Attachment 4.

18. Broadly based on international best practices, SECAP supports the environmental and social categorization of projects into three categories (A, B, C) that are defined according to the likely significance of environmental and social impacts in relation to pre-determined criteria. During the mission that prepared the programme's concept note (CN) the initial environmental and social category assigned was Category B. The basis for this determination was that programme activities did not trigger any of IFAD's Category A criteria and appear to be consistent with the following criteria and categories characteristic of Category

B projects:²⁷ (i) the development of agro-processing facilities; (ii) short-term public health and safety concerns; (iii) agricultural intensification and/or expansion of cropping area in non-sensitive areas that may have adverse impacts on habitats, ecosystems and/or livelihoods; and (iv) credit operations through financial service providers.

19. Similarly, MAP appears to meet the following social criteria typical of a category B project: (i) agricultural intensification and/or expansion of cropping area in non-sensitive areas that may have adverse impacts on habitats, ecosystems and/or livelihoods; (ii) short-term public health and safety concerns and (iii) requiring a migrant workforce or seasonal workers (for construction, planting and/or harvesting).

20. During the preparation of the draft SECAP RN and subsequent review of the Programme Design Report (PDR) this risk category was confirmed and mitigation measures recommended in the revised SECAP RN.²⁸ The main environmental impacts and recommended mitigation measures identified in the SECAP are presented in Table 1 below.

²⁷ Category B projects are those projects whose adverse environmental and/or social implications can be readily remedied with the incorporation of appropriate mitigation measures.

²⁸ The existing SECAP document for MAP was revised and updated the earlier draft RN prepared in November 2019 following the preparation of the draft PDR in December 2019.

Table 1: ESMP Matrix¹

Environmental / Social and climate Impacts	Recommended Mitigation/Enhancement measures	Public Consultation Activities	Responsible Institution in Implementation Phase (possible support agencies)	Means of Verification (Monitoring and reporting)	Frequency of Verification	Cost Estimate
- MAP training and capacity building activities fail to reach migrant workers in agricultural sector	- incorporate migrant workers as one of target groups into project design	- island council - farmers fora	MFMRA/PIU	- documentation of participation in relevant MAP supported training activities	- by event and reported in MAP's M&E system	- costed in existing project design
- groundwater extraction increased due to intensification of agricultural production through shift to high yield varieties - reduction in aquifer recharge due to increased water harvesting, construction of non-permeable slabs associated with project supported construction and lining of existing irrigation canals)	- identify water quality parameters to be measured in conformity with EPA requirements; - conduct groundwater assessments in drought prone islands; - increase project supported water harvesting investments; - use of permeable construction slabs - identify/enlarge/protect recharge areas (catchment areas). The main focus would be on vegetated drainage areas that contribute to aquifer replenishment in particular those areas that terminate in morphological depressions and inland wetlands where they occur on the atolls; and - if needed, offset reduced recharge rates with	- island council - island water users (if present)	MFMRA/PIU MEE (WSD)	- government inspections/private contractor monitoring reports	- bi-annual (wet & dry season)	71,600 ²

	reductions in less important extraction activities.					
- groundwater quality not suitable for agricultural use	<ul style="list-style-type: none"> - identify water quality parameters to be measured as part of the assessment in conformity with EPA requirements; - establish baseline and periodic monitoring where MAP supports groundwater extraction 	<ul style="list-style-type: none"> - island council - island water users (if present) 	<ul style="list-style-type: none"> MFMRA/PIU ARC MEE (WSD) MEE (EPA) MOH (MFDA) 	M&E monitoring reports	<ul style="list-style-type: none"> - bi-annual (wet & dry season) 	<ul style="list-style-type: none"> - costed in project design (infrastructure/equipment for ARC)
- agro-chemical use and disposal (intensification of agricultural production through shift to HY varieties and rolling out of hydroponic schemes and application of drip fertigation)	<ul style="list-style-type: none"> - application of existing policies on banned agro-chemicals; - promote shift towards organic fertilizers using tax policies in compliance with draft agro-chemical bill and M-GAP certification criteria; - provision of support for pest resistant seed varieties; and - support for IPM 	<ul style="list-style-type: none"> - island council - farmer fora 	<ul style="list-style-type: none"> MFMRA MEE (WSD) MEE (EPA) MOH (MFDA) 	<ul style="list-style-type: none"> - government inspections/private contractor; monitoring reports; chemical analyses 	<ul style="list-style-type: none"> Initially monthly (when cleaning closed systems and disposing residues on field crops) with reduced frequency when SOP In place 	<ul style="list-style-type: none"> - costed in project design (infrastructure/equipment for ARC)
- temporary loss of vegetative cover and exposure of soils to precipitation and possible increase in coastal / nearshore sedimentation (land preparation including leveling, seeding and weeding; infrastructure construction	<ul style="list-style-type: none"> - preparation of a construction ESMP indicating specific construction related risks and impacts and their associated mitigation measures; - application of existing EPA/EIA environmental standards for land clearing; - limit construction to dry season; and - use of silt curtains. 	- island council	<ul style="list-style-type: none"> contractor MFMRA MEE (EPA) 	<ul style="list-style-type: none"> - government inspections/private contractor monitoring reports 	<ul style="list-style-type: none"> 3 visits per activity (pre, on-going and post project) 	<ul style="list-style-type: none"> - see FN 2

including research facilities, hydroponic structures, greenhouses, storage / processing / packaging and market facilities)						
- production of various by-products and organic pollution (associated with the respective processing of commodities such as coconut chips, and UHT coconut water, pickles, jam and juice)	- incorporation of effluent treatment and disposal technology in process design -compliance with existing EPA/EIA Water Quality standards and regulations	- island council	MFMRA MEE (EPA) MEE (WSD)	- government inspections/private contractor assessment reports	Initial on-site assessment followed by ad hoc, unannounced site visits	53,760 ⁷
- increase in solid waste (packaging from inputs and for by-product production)	- improved recycling and/or safe disposal of waste per existing policies on solid wastes	- island council	MFMRA MEE (EPA) MEE (WSD)	- government inspections/private contractor; assessment reports	Initial on-site assessment followed by ad hoc, unannounced site visits	- costed under M&E sub-component
- "bankable" business plans and loans support adverse activities not in compliance with GOM/IFAD policies (development of "bankable" business plans)	- provision of guidelines for borrower and financing institutions; - incorporation of environment and social screening templates as part of loan approval process - training ensuring loan resources support activities that are environmentally sustainable, climate change friendly and in compliance with	- island council - SME - farmers fora	- MFMRA - MEE (EPA) - SDFC - MFLC - PIU business development specialist	- guidelines - bank approval documentation	- on demand	- costed in project under component 2

Maldives Agribusiness Programme:
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	government EPA EIA requirements					
- MAP supported infrastructure (new and rehabilitated) and equipment at risk to the effects of storm/tidal surge and ensuing flooding from extreme events	- flood proofing (e.g., application of dry exterior sealants and protection of exterior service equipment (e.g., pumps, generators) in conformity with Maldives national building code.	- island council	- MFMRA - (MHI)	- construction site inspection - insurance policy	- determined by a Construction ESMP	- costed in project design and covered in MAP construction costs
- adverse CC effects on agricultural production	- policy study on feasibility of offering indexed hazard insurance for small farmers	- farmers fora	- MFMRA	- policy study	- NA	- costed in project design
- project-supported activities exacerbate risk and vulnerability to CC effects	- application of existing EPA/EIA environmental screening and mitigation requirements	- island council	MFMRA MEE (EPA)	- government inspections/private contractor assessment reports	- initial on-site assessment followed by ad hoc, unannounced site visits	- costed in existing project design
- failure to collaborate with island-based efforts to reduce CC-related risks and vulnerabilities	- identify on-going/planned island based activities through diagnostic assessments and agree on relevant collaborative activities including training, public awareness and information dissemination	- island council -farmers fora	MFMRA DMC	- review of diagnostic assessments - documentation of participation in relevant CC adaptation/mitigation activities including training	- by event and reported in MAP's M&E system	- costed in existing project design
- agricultural production activities reduce island food security due to replacement of traditional cropping systems	- identify existing cropping systems contributing to food security following natural hazard events (island diagnostics) and screen for possible adverse impacts and appropriate mitigation measures in	- island council -farmers fora	MFMRA DMC	- review of diagnostic assessments - results of environmental screening/assessments of island investments	- by island and reported in MAP's M&E system	- costed in existing project design

with value-added production systems.	project supported interventions					
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IV. Environmental Assessment for Programme and Site-Specific Interventions

21. The MAP is a **national programme** and will cover all of the Maldives' regional and sub-regional hubs, clusters and islands where agriculture is undertaken by small farmers. MAP's component 1 will cover all 19 atolls, 21 regions covering 188 inhabited islands of these 98 are inhabited where agriculture is practised on around 800 registered hectares. There are also 50 uninhabited islands leased for commercial agriculture in the programme are representing 956 hectares of land of which 24 islands are actively doing agriculture on 582 hectares of land. Component 2 will initially focus on regions 1-3, covering 3 atolls and 40 inhabited islands. Of these, 26 are inhabited agriculture islands with 280 hectares registered land cultivated by registered farmers, and 85 hectares cultivated by non-registered farmers. Within this production area there are six active commercial islands cultivating a total of 250 hectares. Finally, component 3 will initially focus on regions 1-3 during the first two years and then expand to regions 4 - 7 and eventually cover the whole country.

Programme Level

22. As noted above MAP qualifies as a Schedule D project and will require the submission of an EIA/IEE application form (Schedule C2) together with a project brief not to exceed three pages requesting an environmental decision statement. The case should be made that at the programme level MAP should pass through only a single scoping meeting and require only an IEE for the entire programme.

23. However, given the number of islands involved in MAP a different process needs to be put in place to screen and where necessary, go through a scoping process for each one receiving support under the Programme.²⁹ Programme proponents will need to provide assurance to both IFAD and the national regulatory authorities that a process is put in place that "captures" and mitigates site-specific issues to warrant maintaining an IEE scoping decision. Finally, a mechanism has to be built into the process that in the rare event that proposed activities trigger the requirement for an EIA, this will be identified and take place following existing regulations.

Site-Specific Intervention Process

24. At the time of appraisal, it is unlikely that many of the islands, their characteristic development options and constraints in the sector and range and nature of MAP-supported activities will be known. Moreover, the Programme is likely to find in the selection and assessment process of candidate islands each are unique. Variables include for example: (i) degree of farming as economic activity and presence of markets, (ii) inter-relationships between farmers and coconut collectors and access to the latter, (iii) environmental constraints (quality of groundwater and access to alternatives), (iv) distance from off-island markets, (v) capacity of the island council, (v) availability and characteristics of labor inputs, (vi) presence of other on-going projects that, due to the size and nature of these small islands, should be collaborative activities integrated with MAP-supported activities. Overlaying this is the status of a number of relevant national programs described in section 3 of the SECAP that MAP should attempt to engage and collaborate.

25. For purposes of the ESMF public consultation, environmental/social impact mitigation and M&E it is recommended that each island be "treated" as a "subproject." Based on initial consultations with the island chief, council and farmers there will be a better understanding of what will be the likely "package" of interventions proposed for MAP-support. In parallel to this process and critical to informing the selection of activities to be included in the "package", baseline conditions for each island should be established and presented in the form of a diagnostic profile (see Attachment 5) preferably one supported by a map. The baseline, results of public consultation and proposed MAP activities would provide the basis for screening, and if needed, flagging follow-up activities to address data gaps and the identification of site-specific mitigation measures and in those rare instances, when a detailed EIA may be required. This baseline and profile will also be critical to the identification of possible collaborative opportunities in particular with

²⁹ There appears to be no provision in the regulations that provide for frameworks when some or all project interventions/sites are unknown at the time of project appraisal. In discussions with EPA during the preparation of the SECAP it was suggested that application for approval should only be done only once the specific islands to receive project support are known. This issue needs to be clarified.

respect to solid waste, integrative water management efforts and CC adaptation interventions (see section 3 in the SECAP).³⁰

Requirements for Environmental Screening and Classification

26. At present, the activities identified for support under MAP do not appear to justify a full EIA. Moreover, if properly prepared and followed-up, the island-specific diagnostic profiles should suffice for designing a package of MAP-supported activities that are more sustainable, collaborative and in so doing justify the IEE scoping decision. Once the diagnostic profiles and island-specific interventions are known, sufficient information should be at hand to screen the proposed activities. An illustrative relative impact matrix and criteria is provided for reference purposes (Attachment 6). This should be refined and included in the Project Implementation Manual (PIM).

27. To support these efforts this Framework supports the inclusion of a number of safeguards in programme design. These include: (i) the prohibition of use of any pesticides banned in the Maldives (Approved and Banned Pesticides (MFMRA, 2019); (ii) screening for and avoidance of MAP supported effects in designated protected areas (List of Protected Areas (EPA, 2019); and (iii) prohibition of conversion and any adverse project impact on critical habitat (lagoons, mangroves and other wetlands, marine grassbeds and/or coral reefs. An illustrative “blacklist” of activities has been provided in Attachment 7 that should be prohibited from receiving programme support in the absence of meeting the associates stated measures. This needs to be refined and included in the PIM.

28. Specific roles and responsibilities of relevant institutions are provided in Section VI below.

Requirements for Environmental Assessments and Environmental Management Plans

29. See Attachment 8.

V. Public Consultation, Information Disclosure and Grievance Redress Mechanism

Public Consultation

30. In conformity with IFAD’s emphasis on participation in programme/project design and implementation, greater consultation by communities (especially the marginalized poor) and stakeholders that are likely to be affected by IFAD’s operations will continue to be sought during the respective programme/project cycle. The objective of such consultation is to receive feedback on the draft Environmental and Social Impact Assessment (ESIA) report and other relevant documents, ensure broad community support to the project (especially a Category A project or one that is highly sensitive to climate risks), and see that affected people endorse the proposed mitigation/ risk reduction and management measures. Consultation, leading to consent, should be initiated as early as possible during design and the results will be adequately reflected in SECAP assessments (and other relevant documents) reports. IFAD’s policies on targeting, gender equality and women’s empowerment, improving access to land and tenure security, and engagement with indigenous peoples contain further guidance on appropriate consultation mechanisms. For purposes of this ESMF public consultation will focus on the island level engaging the island chief, council and farmers. In some cases where issues may transcend the sector (e.g. water) broader consultation may be required. Later after famers fora are created with support of the MAP, they may be the most efficient means to continue the consultation process.

Grievance Redress Mechanism

31. IFAD has established a Complaints Procedure to receive and facilitate resolution of concerns and complaints with respect to alleged non-compliance of its environmental and social policies and the mandatory aspects of its SECAP in the context of IFAD-supported projects. The procedure allows affected complainants to have their concerns resolved in a fair and timely manner through an independent process. Although IFAD normally addresses potential risks primarily through its enhanced QE/QA process and by means of project implementation support, it remains committed to: (i) working proactively with the affected parties to resolve complaints; (ii) ensuring that the complaints procedure is responsive and operates effectively; and (iii) maintaining records of all complaints and their resolutions. Complaints must concern

³⁰ One example of the potential benefits derived from a collaborative activity would be between WMD (MEE) and DOA (MFMRA) where the former is working with farmers to dispose of their vegetative matter but don’t have the expertise of the latter to assist them in its use in making and applying compost.

environmental, social and climate issues only and should not be accusations of fraudulent or corrupt activities in relation to project implementation – these are dealt with by IFAD's Office of Audit and Oversight. More information can be found on the IFAD website (ifad.org).

32. At the Project level, a Grievance Redress Mechanism will be established in line with IFAD policies and procedures and national laws. The GRM will include the following steps:
- a. Step 1: **Submission of grievances** either orally, in writing, or through telephone hotlines/toll free numbers, SMS, to the Ministry of Fisheries, Marine Resources and Agriculture (MOFMRA)
 - b. Step 2: **Recording of grievances**, classifying the grievances based on the typology of complaints and the complainants in order to provide more efficient response, and providing the initial response within 24 hours. The typology will be based on the characteristics of the complainant (e.g., vulnerable groups, persons with disabilities, people with language barriers, etc.) and also the nature of the complaint
 - c. Step 3: **Investigating the grievance** and Communication of the Response within 7 days
 - d. Step 4: **Complainant Response**: either grievance closure or taking further steps if the grievance remains open. If grievance remains open, complainant will be given opportunity to appeal to the MOFMRA.
 - e. Once all possible avenues of redress received grievances have been proposed and if the complainant is still not satisfied then s/he would be advised of their right to legal recourse. In addition, the existing GRM will also be used for addressing Sexual Exploitation and Abuse in line with IFAD's no tolerance for Sexual Exploitation and Abuse (SEA) policy.

VI. Institutional Arrangements and Responsibilities

33. The overall responsibility for the MAP implementation will be assumed by the Ministry of Fisheries, Marine Resources and Agriculture (MOFMRA), which is the lead Programme Agency. The Ministry of Finance (MOF) will be responsible for ensuring timely flow of funds to MOFMRA for programme implementation. A Programme Steering Committee (PSC) chaired by the Permanent Secretary of MOFMRA and encompassing representatives from the related ministries such as MOF, Ministry of Economic Development (MED), Ministry of National Planning and Infrastructure (MONPI), MOE and other stakeholders that are related and relevant to the Programme. A Programme Implementation Unit (PIU) will be established in the Planning and Programme Coordination Section of MOFMRA and located within or in proximity of MOFMRA. The PIU will be responsible for the overall operational management and coordination of the programme implementation.

34. To support the recommendations of the SECAP and ESMF, the PSC should include representatives from MEE and EPA and the designation of their respective technical colleagues as focal points from Climate Change Department (CCD), Water and Sanitation Department (WSD) and Waste Management and Pollution Control Department (MMD).

35. The PIU, with the assistance of selected technical staff from the Ministry, MACO and/or ARC, and in some cases representatives from other relevant technical agencies supported by consultants, will be responsible for:

- submit MAP's EIA/IEE application form (Schedule C2) together with the programme brief to EPA, participate in scoping meeting and follow up with the contracting of a registered consultant to prepare either the IEE/EIA dependent on the scoping decision;
- refining and finalizing the screening criteria and "blacklist";
- fielding small, multi-disciplinary teams to prepare the island-specific diagnostics; a process that would be mainstreamed into the public consultation process required before finalizing the package of island-specific interventions;
- screening activities to be supported by MAP;
- based on the results of the screening and the agreed on findings of the MAP SECAP incorporate necessary mitigation measures into programme activities;
- where required ensuring that all regulatory clearances are obtained before initiation of activities (e.g., starting civil works);
- ensuring that proposed mitigation measures and monitoring programs are properly implemented;
- in those cases where proposed activities may warrant a Category A classification review whether supplementary studies may be required subsequent to which, if necessary, contract the EIA to a registered consultant per national requirements;
- incorporate awareness training in environmental management and climate change as part of MAP's training and public awareness activities;

- ensuring that meaningful public consultations (including both men and women) are undertaken with affected groups and local NGOs. The list of people attending the consultation, time and locations, subjects discussed during consultation will be recorded in a systematic manner; and
- sharing information and disclosure of environmental safeguard information where required.

36. IFAD will take the following responsibilities:

- review MAP's draft IEE/EIA dependent on the scoping decision;
- publicly disclose the final IEE/EIA before project appraisal;
- monitor the development and implementation of selected island-specific MAP-supported interventions and mitigation measures as part of overall project review mission; and
- provide assistance to the EA/IA, if required, in carrying out its responsibilities and safeguard capacity building.

VII. Monitoring and Reporting

37. MAP's basic M&E framework will be designed on the basis of a logframe approach, which is driven by the programme logical framework with a set of key indicators. The M&E system will be set up before the field operations' roll-out. The system set-up will be led by the Planning and M&E Officer/Specialist of PIU, who reports directly to the Programme Director. In view of the yet-to-be built M&E capacities, short-term consultant should be recruited to support the system set-up.

38. However for technical monitoring for project interventions flagged as requiring mitigation measures (e.g., residual water disposal) technical M&E system will need to be put in place to reflect the results of baseline conditions and the results of ad hoc or periodic monitoring depending on the requirements. Based on the results of the screening and environmental assessment, where mitigation measures are warranted, these will include environmental monitoring plans to ensure that negative environmental impacts are addressed properly. It will identify environmental parameters to be monitored, frequency of monitoring, applicable standards, agencies and institutions responsible for monitoring and provide indicative monitoring costs.³¹

39. Reporting requirements with respect to the mitigation measures will be agreed on between IFAD and MFMRA. The budget for environmental monitoring shall be included as part of the contracts for relevant activities.

40. Indicators suggested for consideration for inclusion in MAP's Results Framework and M&E system in line with the proposed programme activities are presented in Table 2.

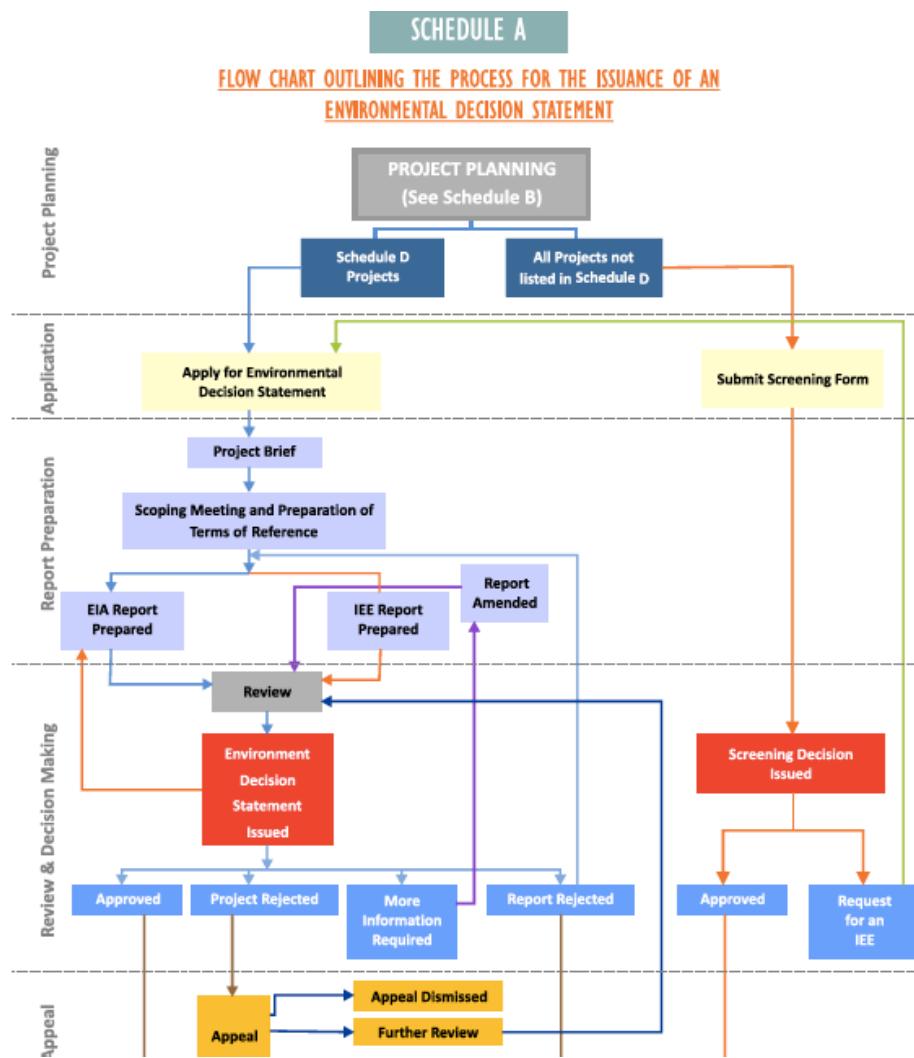
Table 2. List of Recommended Monitoring Indicators for Maldives Agricultural Programme (MAP)

Activity	Suggested Monitoring Indicators
water-harvesting	- reductions in offtake from aquifer through bore holes (mt ³)
lining irrigation canals (TBD)	- increase in water use efficiency (%) - changes in aquifer levels (meters) and usage (mt ³)
agricultural inputs	- uptake of pest resistant seed varieties and use of IPM practices (#/type of practices adopted) - reduction of use of agro-chemicals in programme areas(decrease in volume from baseline by class) - groundwater quality (presence and concentration of selected pesticides and fertilizers)
land-levelling (TBD)	- increase in water use efficiency (%)
production facilities (construction and processes)	- for "greenfield" sites, inspection to ensure new facility is appropriate for designated land use (# and compliance with EIA requirements) - presence and concentrations of selected pollutants at "end of pipe" discharge of facilities/processes supported under the project

³¹ This does not have to be burdensome. For example, once a baseline is established for the disposal of residual waters associated with fertigation and the technology and protocol to manage these wastes are in place, if M&E results demonstrate that no adverse impact is occurring, follow-up monitoring efforts can largely focus on the protocols and processes themselves only occasionally controlled by field inspections (e.g., on an annual basis). Similar approaches apply to application of agro-chemicals and disposal of project related project wastes.

	- development and adoption of improved recycling and/or safe waste disposal technologies (#) - increase in recycling efficiency (%)
promote adoption of sustainable certification schemes	- functioning pilot certification schemes (#) - premium paid for certified products over baseline (MDV)
“bankable” business plans	- development and application of environmental guidelines incorporated into the plans
capacity building	- events (#) people trained (per-time) in climate change and environmental impact mitigation
increasing public awareness (PA)	- events (#) and people (#) participating in climate change oriented PA activities

Attachment 1. EIA Process for Schedule D Projects



Attachment 2. EIA/IEE Application Form (Schedule C2)

Part 1: Proponent's Information

Name of person submitting form:
On behalf of (company, other person, self):
Address:
Telephone number:
Fax number:
Email:
ID number:
Signature:
Date:

Part 2: Project Description

Project Title	
Type of development:	New development: Additions or improvement to existing development:
Location of project:	(Attach location plan and photos of site)
Duration of project:	(number of months)
Government agency(s) responsible for authorization:	
Financial support for project provided by:	
Brief description of project activities in chronological order (include information about equipment and machinery to be used):	
	(Please use additional sheets where appropriate)

Consultant's Information

Name:
Address:
Telephone number:
Fax number:
Email:
ID number:
EIA Consultant's Registration Number
Signature:
Date:

Attachment 3. List of Development Proposals Requiring an EIA Study (Schedule D)

Development of new tourism resorts
Additions and large-scale developments to resorts
Aquaculture projects
Fish processing facilities
Artificial reefs

Agriculture projects

Livestock and animal husbandry
Large scale deforestation
Construction/dredging of Harbours
Cutting, dredging and maintenance of channels
Construction of jetties
Development of marinas
Land reclamation projects
Sea defense structures (such as seawalls, revetments, offshore breakwaters, groynes)
Beach nourishment
Construction of major roads
Development of airports, helipads/Seaplane hubs
Major housing projects
Development of factories
Incinerators
Landfills
Large-scale waste storage and separation facilities
Bottling plants
Water supply projects
Sewerage projects
Marine outfall pipes
Powerplants
Oil, fuel and gas storage, handling and refining facilities
Desalination plants

Attachment 4. Comparative EA Screening Categories of MAP-supported Activities

MAP Activities supported by Component	MEE EIA Schedule D unlisted (either approved or IEE required)	IFAD Category C	MEE EIA Schedule D listed: determination (IEE required)	IFAD Category B	MEE EIA Schedule D listed: determination (EIA required)	IFAD Category A
Component 1 - infrastructure construction / reform - equipment purchase - policy studies - purchase of chemical inputs and planting material - TA - training & workshops - adaptive research	- X X - X X X		X - - X - - -		NA	
Component 2 - production activities - farmer training - financing business plans	- X -		X - X		NA	
Component 3 - value chain infrastructure - TA - training - market infrastructure investments	- X X -		X - - X		NA	
Component 4 - equipment & goods - KM products - TA - training - M&E - salaries	X X X X X X		NA		NA	

Attachment 5. MAP: Illustrative Island Socio-economic Diagnostic and Profile

(general)

- name of island:
- size:
- location (coordinates):
- atoll:
- NAP 2020-2040:
- population (gender specific if possible):
- number of registered farmers (gender specific if possible)
- number of unregistered farmers (gender specific if possible)
- number of migrant workers (if available)

(major natural features)

- main water features (water courses, lagoons, wetlands, aquifer)
- natural forests/vegetation (type and estimated area)
- critical habitat (natural forests, lagoons, wetlands and mangroves, marine grassbeds, coral reefs)
- protected areas (type, size, location)

(natural resources management)

- soils
- water quality
- water quantity

(cultural resources)

(main environmental threats)

- exotic pests
- water scarcity
- water contamination
- drought

(status public services)

- access to water
- liquid wastes management
- solid waste treatment and management
- other

(on-going/proposed) national programmes

- solid waste
- integrated water management
- other

(MAP interventions)

- existing agricultural production systems
- proposed activities to be supported by MAP to include
 - o interventions to be supported
 - o location and area
 - o existing vegetative cover
 - o number of beneficiaries (disaggregated by sex)
 - o nature of tenure/farmer access
 - o source, quality and disposal of residual water
 - o production and disposal of solid wastes

(natural hazards and adaptation)

- main CC and natural hazards)
- main adaptation measures by hazard

Attachment 6. Relative Impact Matrix

Impact	Attributes			
	Nature	Magnitude	Significance	Duration
- water contamination				
- soil contamination				
- contributing to water scarcity				
- habitat conversion / degradation				
- loss of biodiversity				
- etc...				

Attachment 7. Illustrative Blacklist of Activities Prohibited for MAP Support

- activities in existing declared protected areas
- activities in or affecting critical habitat (either directly or offsite adverse impacts
- activities presenting a threat to existing wildlife and natural vegetation
- deforestation/clearing of natural vegetation
- use of banned agro-chemicals in the Maldives
- activities contributing to pollution of water course/bodies (agro-chemicals, residues from closed water fertigation systems) and processsing wastes of agricultural by products (e.g., taro chips) in the absence of testing and treatment if required
- activities that depend on use of groundwater resources in absence of water quality analysis demonstrating safe use for agriculture purposes (water quality)
- activities that depend on groundwater in water scarce islands in absence of an integrated water management plan (water quantity)
- activities whose sustainability may be affected by security of farmer access to island lands
- activities resulting in dissemination and/or sprad of existing exotic species
- development of greenfield sites for infrastructure and agricultural production in absence of an EIA
- activities that will contribute to soil degradation (erosion, salinization, nutrient depletion, contamination) in absence of soil management plan

Attachment 8. Contents of an EIA Study (Schedule E)

Title Page

This should contain:

- title of the IEE or EIA
- location of project
- team responsible for the report
- proponent's name and signature
- date report was completed

Non-technical Summary

This should be:

- concise and use simple, non-technical language
- it should include an outline of the project and its location
- it should focus primarily upon selection of alternatives, key impacts and mitigation measures

Introduction

This should provide background information on the project and its costs, the proponents and their experience with similar projects.

Terms of Reference

The agreed terms of reference for the IEE or EIA report must be included as an annex in the report.

Project Setting

This section should indicate how the project conforms with existing plans, policies, guidelines, regulations, laws and International Conventions.

Project Description

This should describe the project and indicate the justification and rationale underlying the project, including:

- Intended duration of the project
- Need and justification of the project
- Ownership of land and proof thereof, or lease agreement, clearly indicating the owner's consent to the project
- Components of project design, size and scale of the project
- Location map
- Scaled site plan showing location of all proposed infrastructure (including the entire wastewater collection, treatment & disposal system), setback of buildings from high water mark, landscaping works etc.
- Architectural plans if available, or sketches or architect's impression of the project **in** the receiving environment
- Indication of other similar projects in the area and reference to previous IEE **or** EIA studies relating to such projects
- Description of the expected environmental conditions at the time of probable project implementation, and associated constraints e.g. seasons, tidal regime etc.
- Description of the proposed wastewater process supported by flow diagrams
- Measures adopted to promote sustainable development (cleaner production, renewable Energy systems) during both the implementation and operational phases of the project
- Work plan of activities during the site preparation, construction, decommissioning and operational phases of the project
- Any Environmental Management System adopted for its operations
- Availability of water, other utilities and resources
- Capital investment and employment opportunities

A brief outline should be given of any enhancement work which is planned. This should be distinguished from mitigation measures, which are integral to the project and form part of the proposal. For example upgrading of an access road for the public, providing

Description of the Natural, Economic and Human Environment

This should include:

- Certified and comprehensive site plans drawn to scale (by a Sworn Land Surveyor) with known landmarks as reference points, and showing Valued Ecosystem Components, water bodies, wetlands, low water mark, high water mark and beach frontage

- Aerial photographs of the site
- Description of site characteristics including soil type, relief, landforms, present land use, drainage systems
- Type of flora and fauna, rare or endangered species, sensitive habitats of ecological importance including wetlands and mangroves
- Marine environment including sand and rocky bottoms, coral reefs, sea grass beds
- Beach systems; composition; stability; current, tide and wave dynamics
- Description of surrounding infrastructure, including utilities
- Socio-economic characteristics including population (numbers, ages, density, distribution), economic activities, housing **and** utilities, employment statistics and available skills, labour availability, unique cultural characteristics
- Other attributes of the locality e.g. amenities, recreational values

Methodology

- Data collection methods, description of gaps in baseline data (note it is not necessary to include all the baseline data in the report, but it must be available for inspection, or submission, on request)
- Information on the uncertainties and assumptions involved in interpreting the data
- Analytical techniques and predictive methods

Public Consultation

This is an important part of the IEE and EIA process and the report should include:

- A list of the persons consulted including persons in statutory bodies, atoll and island offices, community groups and NGOs, local residents, local fishermen, tourism operators and any others likely to be affected by the proposed development
 - Information on how, when and where the consultations were conducted, e.g. stakeholder meetings in the affected area, individual meetings, questionnaires
 - Summary of the outcome of the consultations including the main concerns identified
- Assessment of the Direct and**

Indirect Environmental Impacts

Impacts on the biophysical, economic and human environments, including the impacts on the human well being should be clearly defined and discussed with special emphasis on the key issues identified during the scoping process. Less important impacts should be mentioned but the amount of space devoted to them should be proportional to their perceived importance.

Evaluation of Alternatives Including No Development Option

- Identify and describe at least three alternatives, one of which should be the no- development option; define clear criteria to evaluate the alternatives, and determine the preferred alternative
- Discuss whether the project be undertaken elsewhere, perhaps an alternative location with less adverse impacts
- Include discussion on alternative ways in which the project may be carried out so as to cause less harm to the environment.

Selection of the Preferred Alternative and Mitigation Measures

Discuss the preferred alternative and why it was selected. Identify the major and minor environmental impacts of the preferred alternative and propose measures to mitigate the adverse environmental impacts.

Environmental Monitoring

An Environmental Monitoring Plan should be included that contains provisions made for on-site monitoring during (1) site preparation, (2) construction/implementation, and (3) decommissioning phases; as well as the longer term maintenance requirements.

The cost of the monitoring should be determined and clearly stated in the IEE/EIA report.

The environmental monitoring plan will include the following components over the different project phases (Site Preparation, Construction/implementation Phase, Decommissioning Phase):

- Site characteristics (include plans/photographs/drawings/ showing the project area, any environmental sensitive receivers, beach profiles and ambient air/water/sea water qualities)
- Works involved and proposed mitigating measures to prevent negative impacts **on** water course/lagoon/beach/road users/immediate neighbors
- Clauses to be included in contract documents to ensure implementation of proposed mitigating measures

Parameters to be monitored

- Monitoring methodology
- Monitoring locations and control stations
- Monitoring frequency and duration
- Persons to conduct the monitoring and undertake the data analysis and reporting
The institutional system by which monitoring data will be collected, analysed, interpreted and action taken, if necessary, to prevent or reduce unwanted impacts
- Procedures for reporting to the authorities
- Contingency **plan** (in case of emergencies such as uncontrolled discharge of pollutants, fire outbreak, natural calamities)
- Allocation of financial resources by the developer
- Maintenance component including building maintenance, daily and periodical maintenance of the site, setting up of appropriate maintenance teams for treatment plant, standby generator, etc.
Reporting should be done annually, with summary reports at 2-monthly intervals.

Conclusions

This section should contain a final statement relating to the selection of the preferred alternative, the mitigation measures and the environmental monitoring that will be undertaken.

Name:

Signature:

Date:

Appendices

These should include:

- terms of reference for the IEE/EIA
- additional technical information and baseline data
- full list of references
- names and Registration Certificate numbers of the EIA consultants
- CVs of any unregistered individuals who participated in the preparation of the EIA/IEE report



Investing in rural people

Maldives

Maldives Agribusiness Programme

Project Design Report

Annex 6: First Annual Work Plan and Budget (AWPB)

Mission Dates: 12 - 29 November 2019

Document Date: 22/06/2020

Project No. 2000002416

Report No. 0000

Asia and the Pacific Division
Programme Management Department

Annex 6: Annual Work Plan and Budget

1. **Annual Work Plan and Budget.** The annual work plan and budget (AWPB) constitute the annual basis for implementation and clearly describe the strategic direction of the programme, the expected results under each component, and associated risk mitigation measures. The PIU will prepare the AWPBs, in consultation with all stakeholders (MACO, ARC, Island Farmer Forums, commercial islands, wholesale markets, etc). A participatory annual planning process will be set up with Island Farmer Forums to ensure bottom-up feedback on community needs, priorities, contextual opportunities and limitations.
2. The PIU will seek PSC and IFAD approval for each AWPB in advance of the national annual budgeting process in order to ensure sufficient counterpart funding. IFAD supervision missions will offer opportunities to review implementation progress against annual targets.
3. The following tables present the Annual Work Plan and Budget for 2020-2021.

Annual Work Plan and Budget (PY1)

Country: Republic of Maldives

Project: Maldives Agribusiness Programme

Component 1. Enabling Services

Sub-component 1.1. Knowledge and Technology

No	Description of Activities	Category	Outputs	Budgeted 2020-2021, 000'USD	Financing Source, 000'USD		
					IFAD Loan	IFAD Grant	Govt Budget
1	<u>Upgrading Agriculture R&D Center (North)</u>						
1.1	<i>Equipment and Goods</i>						
1.1.1	Upgrading laboratory facilities (to measure water quality for irrigation, fertility of soils, plant tissue nutrition and identify plant diseases)	I	1 lab	152	137	-	15
1.1.2	Improved greenhouse fitted hydroponic planting gutter space (for humid and hot climate, movable gutter to make space for operation lanes optimizing the use of floor space)		350m2	44	40	-	4
1.1.3	Closed vertical production using artificial light /d Net houses against insects and shade fitted with hydroponic systems /e		100m2	35	28	-	7
1.1.4	Net houses against bats /f		500m2	4	3	-	1
1.1.5	Concrete apron for compost making		100m2	1	0	-	0
1.1.6	Compost equipment /g		200m2	28	23	-	6
1.1.7	Open field hydroponic production bucket system using drip (set covers 100 m2)		1 unit	25	20	-	5
1.1.8	Reagents, fertilizer, pest control agents (chemicals and biological)		5 units	0	0	-	0
1.1.9	Tools like refractometer, tissue and soil nutrition analysis meter, insect catch plates and microscope		lumpsum	5	4	-	1
1.1.10	Open field drip irrigation		lumpsum	5	4	-	1
1.1.11	Grafting equipment		5 units	13	10	-	3
1.1.12	HDPE drain cell rainwater storage tank dug in to the soil		5 units	3	2	-	1
1.1.13	Rainwater polythene collection sheet with pump sump		200m2	30	24	-	6
1.1.14	Photovoltaic solar system (10 Kw)		500m2	1	0	-	0
1.1.15	Battery backup (9 KW)		1 unit	14	11	-	3
1.1.16	Policy studies	II	1 study	30	-	30	-
3	<u>Knowledge and Technology (AR&DC)</u>						
3.1	<i>Adaptive research (inputs)</i>	II					

3.1.1	Identification of best varieties (various crops)		1 research	4	3	-	0
3.1.2	Establishing best hydroponic fertilisation for greenhouse, closed system and field systems		1 research	4	3	-	1
3.1.3	Establishing best drip fertigation for open fields (annual crops)		1 research	4	3	-	1
3.1.4	Establishing best drip fertigation for open fields (perrenial crops)		1 research	4	3	-	1
3.1.5	Identification of compost amounts for crop production in open field		1 research	4	3	-	1
3.1.6.	Development of IPM recommendations for the various crops in greenhouse, closed system and open field		1 research	4	3	-	1
3.1.7	Development of organic pest recommendations for the various crops in greenhouse, closed system and open field		1 research	4	3	-	1
3.1.8	Preparation of farm budget based on field records for each recommendations developed		1 research	4	3	-	1
3.1.9	Preparation of promotion material videos, pamphlet, prospectus for different systems		10 products	4	3	-	1
3.2	<i>Materials</i>	I	lumpsum	4	3	-	1
3.2.1	Planting material						
4	<u>Knowledge and Technology Transfer</u>	II					
4.1	<i>Technical assistance (UNOPS)</i>						
4.1.1	Chief Technical Advisor		1 consultant hired	146	-	146	-
4.1.2	Unspecified TA		1 consultant hired	66	-	66	-
4.1.3	UNOPS management fee		1 consultant hired	12	-	12	-
4.2	<i>Technical assistance - extension</i>	II					
4.2.1	Development of the MGAP protocols for various crops produces		1 protocol	10	10	-	-
4.2.2	Development of hand book for MGAP implementation		1 handbook	5	5	-	-
4.2.3	Development of produce standards guided by FAO's Codex Alimentarius		1 consultant hired	22	22	-	-
4.3	<i>Technical assistance - other</i>	II					
4.3.1	Establishment of Agriculture Information and Communication Technology (AICT) platform		1 platform established	32	32	-	-
4.3.2	Illustrated training material		10 brochures prepared	15	15	-	-
4.4	<i>Training and workshops</i>	II					
4.4.1	Project awareness on participating island		6 islands covered	3	3	-	-
4.4.2	Assisting farmers to form institutional frame work e.g. farmers' forum for decision making on production		6 islands covered	3	3	-	-
4.4.3	Assisting the Farmers' Forum to select an extension-linkage farmers (farmer to farmer)		6 islands covered	3	3	-	-
4.4.4	Training of selected link farmers (LF)		12 LFs	6	6	-	-
	Total			756	443	254	60

Annual Work Plan and Budget (PY1)

Country: Republic of Maldives
Project: Maldives Agribusiness Programme

Component 1. Enabling Services						
Sub-component 1.1. Input Supply						
No	Description of Activities	Category	Outputs	Budgeted 2020-2021, 000'USD	Financing Source, 000'USD	
					IFAD Loan	Govt Budget
1	<u>MACO institutional capacity building</u>					
1.1	<i>Equipment and goods</i>					
1.1.1	Walking tractors and implements	I	10 units	25	23	3
1.1.2	Rain water harvesting and storage systems		1 unit	253	228	25
1.1.3	Stock of inputs for MACO's supply retail outlet		lumpsum	122	109	12
1.1.4	Provision of climate resilient planting materials		lumpsum	122	109	12
1.1.5	Initial stock of greenhouses, closed vertical production units and net houses		60 units	314	282	31
1.1.6	Reusable plastic crates		lumpsum	30	27	3
1.1.7	Solar/photovoltaic systems		1 unit	57	51	6
1.1.8	Drip fertigation system and delivery systems		1 unit	66	59	7
1.1.9	Initial stock of solar driven cold storage		5 units	177	159	18
1.2	<i>Training</i>	II	3 courses	30	30	-
1.2.1	Training of shop keepers/agriculture extension staff					
1.3	<i>Technical assistance</i>	II	6 persons	102	102	-
1.3.1	Agronomist/extension					
Total				1 298	1 181	117
						0

Annual Work Plan and Budget (PY1)

Country: Republic of Maldives

Project: Maldives Agribusiness Programme

Component 2. Climate Smart Production								
No	Description of Activities	Category	Outputs	Budgeted 2020-2021, 000'USD	Financing Source, 000'USD			
					IFAD Loan	IFAD Grant	MACO	SDFC
1	<u>Financial products</u>	II						
1	Development of financial products		1 consultant hired	6	6	-	-	-
1	Use of financial products		1 consultant hired	6	6	-	-	-
1	Understanding and interpretation of agriculture business plans		1 consultant hired	6	6	-	-	-
Total				17	17	-	-	-

Annual Work Plan and Budget (PY1)

Country: Republic of Maldives

Project: Maldives Agribusiness Programme

No	Description of Activities	Category	Outputs	Budgeted 2020- 2021, 000'USD	Financing Source, 000'USD			
					IFAD Loan	IFAD Grant	Private Invest	Govt Budget
1	<i>Training</i>	II	1 course	0.253	0.253	-	-	-
1.2	Food safety and quality (training to vendors at regional market hubs)		1 course	0.25	0.25	-	-	-
1.3	Contract farming /b		1 course	5.06	5.06	-	-	-
1.4	MGAP for CAI advisers		1 course	6.08	6.08	-	-	-
1.5	Contract farming for CAI advisers		1 consultant hired	6	6	-	-	-
2	<i>Technical assistance</i>	II	lumpsum	1	1	-	-	-
2.1	Development of transparent pricing systems							
2.2	Provision of logistical management support to transport produce to Male							
3	<i>Market infrastructure investments</i>	III						
3.1	Matching grants: duplication of production systems at the R&DC (to selected CAI at 20% of investment costs)		lumpsum	9	6	3	-	-
3.2	Matching grants: upgrading cold storage on transport vessels (to selected CAI at 20% of investment costs)		1 cold storage	30	20	11	-	-
3.1-3.2	Contribution of CAI for market infrastructure investments			156	-	-	156	-
Total				213	43	14	156	-

Annual Work Plan and Budget (PY1)

Country: Republic of Maldives

Project: Maldives Agribusiness Programme

No	Description of Activities	Category	Outputs	Budgeted 2020-2021, 000'USD	Financing Source, 000'USD	
					IFAD Grant	Govt Budget
1	<u>Equipment and Goods</u>	I	lumpsum	25	-	25
2	<u>Technical Assistance</u>	II	contract	3	-	3
2.1	Internal audit					
3	<u>Staff Training</u>	II	1 course	3	-	3
3.1	Project management		1 course	3	-	3
3.2	Business management		1 course	3	-	3
3.3	Gender focus		1 course	3	-	3
3.4	Innovation enhancement		1 course	3	-	3
3.5	Study tours		1 tour	10	-	10
4	<u>Integrated M&E and KM</u>	II	MIS established	10	10	-
4.1	<i>Studies and impact assessment</i>		1 study conducted	20	20	-
4.1.1	Development of MIS system		1 study conducted	3	3	-
4.1.2	Baseline study					
4.1.3	Thematic studies					
4.2	<u>KM</u>	II	lumpsum	3	3	-
4.2.1	Information dissemination seminars and workshops (start-up)					
5	<u>Salaries</u>	IV	1 person hired	24	-	24
5.1	Project Director		1 person hired	21		21
5.2	Planning and admin officer		1 person hired	21		21
5.3	Policy and institution specialists		1 person hired	21		21
5.4	Agriculturalist/extension		1 person hired	21		21
5.5	Business development specialist		1 person hired	21		21
5.6	Gender and targeting officer		1 person hired	21		21
5.7	M&E and KM officer		1 person hired	19		19
5.8	Financial management specialist		1 person hired	21		21
5.9	Accountant		1 person hired	19		19
5.1	Accountant assistant		1 person hired	12		12
5.1	Procurement officer		1 person hired	19		19
5.1	Support staff		5 persons hired	49		49
6	<u>Performance-based incentives (about 20% of base salary based on staff performance)</u>	IV	PBS established	36	36	-
7	<u>Allowances</u>	IV	per annum	8	-	8
8	<u>Operational expenditures</u>	IV				
8.1	Office running costs (including for PSC meetings, meetings of tender committees, travel and stationeries)		lumpsum	11	-	11
8.2	Office rent		office rented	5	-	5
Total				414	72	342



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Maldives Agribusiness Programme

Project Design Report

Annex 7: Procurement Plan for first 18 months

Mission Dates: 12 - 29 November 2019

Document Date: 22/06/2020

Project No. 2000002416

Report No. 0000

Asia and the Pacific Division
Programme Management Department

MALDIVES AGRO-BUSINESS PROJECT PROCUREMENT PLAN 2020-21

Consultants

Country/Organisation : MALDIVES/PIU-MINISTRY OF FISHERIES, MARINE RESOURCES & AGRICULTURE

Project/Programme : MALDIVES AGRO-BUSINESS PROJECT

Loan/Grant # :

Procurement Period :May 2020 to October 2021

PROCUREMENT PLAN (CONSULTANTS))



Investing in rural people

Maldives

Maldives Agribusiness Programme

Project Design Report

Annex 8: Project Implementation Manual (PIM)

Mission Dates: 12 - 29 November 2019

Document Date: 22/06/2020

Project No. 2000002416

Report No. 0000

Asia and the Pacific Division
Programme Management Department



Investing in rural people

Republic of Maldives

Maldives Agribusiness Programme (MAP)

Project Implementation Manual (DRAFT)

Document Date:
Project No. xxxx

Asia and the Pacific Division
Programme Management Department

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- Appendix 6:** **Detailed cost tables.**

Currency equivalents

Currency Unit	=	Maldivian Rufiyaa (MVR)
USD1.0	=	MVR 15.35

Weights and measures

1 kilogram	=	1000 g
1 000 kg	=	2.204 lb.
1 kilometre (km)	=	0.62 mile
1 metre	=	1.09 yards
1 square metre	=	10.76 square feet
1 acre	=	0.405 hectare
1 hectare	=	2.47 acres

Abbreviations and acronyms

AA	Authorized Allocation
AICT	Agriculture Information and Communication Technology
ARC	Agriculture Research Center
AWPB	Annual Work Plan and Budget
CSN	Country Strategic Note
CTA	Chief Technical Advisor
CVA	Climate Vulnerability Assessment
DA	Designated Account
ELF	Extension Link Farmer
EOI	Expression of Interest
FA	Financing Agreement
FAO	Food and Agriculture Organization
FADiP	Fisheries and Agriculture Diversification Program
FM	Financial Management
GAP	Good Agricultural Practice
GDP	Gross Domestic Product
GoM	Government of Maldives
HACCP	Hazard Analysis and Critical Control Point
ICP	IFAD Client Portal
ICU	Implementation Coordination Unit (MACO)
IFAD	International Fund for Agriculture Development
IPSAS	the International Public Sector Accounting Standards
KM	Knowledge Management
LDH	Loan Disbursement Handbook
Ltd.	Limited
LTB	Letter to Borrower
MACO	Maldives Agriculture Corporation
MAP	Maldives Agribusiness Progreamme
M&E	Monitoring and Evaluation
MED	Ministry of Economic Development
MEDeP	Mariculture Enterprise Development Project
MGAP	Maldives Good Agricultural Practice
MGFSS	Ministry of Gender Family and Social Services
MFLC	Maldives Finance Leasing Company
MOFMRA	Ministry of Fisheries, Marine Resources and Agriculture
MOF	Ministry of Finance
MONPI	Ministry of National Planning and Infrastructure
MoU	Memorandum of Understanding
MSME	Micro, Small and Medium-Scale Enterprises

ORMS	Operational Results Measurement System
PCR	Project Completion Review/Report
PD	Programme Director
PIU	Programme Implementation Unit
PIM	Programme Implementation Manual
PSC	Programme Steering Committee
Pvt.	Private
RCF	Revolving Credit Fund
SDFC	SME Development Finance Corporation
SDG	Sustainable Development Goal
SECAP	Social Environment and Climate Assessment
SME	Small and Medium Enterprises
SOE	Statement of Expenditure
TA	Technical Assistance
UNOPS	United Nations' Office for Project Services
VCC	Value Chain Cooperative
WA	Withdrawal Application

Map of the programme area

Insert map

I. Introduction

A. Function and status

1. This draft Project Implementation Manual (PIM) provides guidelines for the implementation of the Maldives Agribusiness Programme (MAP). The PIM elaborates how policy support, institutional capacity building and strengthening of institutional agri-technical support system take place under the programme framework and how programme investments will mutually leverage for enhanced production and market connection with improved agricultural practices. These guidelines are supported by formats, standard documents, terms of references, agreements and examples.
2. The PIM is drafted primarily on the basis of the main Project Design Report (PDR). It is stressed that this present PIM is a draft made at design time and it is a live document that will need to be carefully reviewed by all major stakeholders in the Programme, with periodic revisions to be made where needed. Any changes proposed as a result of such a review will, however, require the concurrence of IFAD before such a change is included as an approved programme implementation procedure or approach. Submission of a revised draft of the Programme implementation procedures by the Programme Implementation Unit (PIU) should be one of the key milestones for operational effectiveness of the Programme.

B. This document

3. Implementation procedures for the Programme are described in the subsequent chapters after the introduction as chapter I, as follows:
 - Chapter II – Overall programme framework
 - Chapters III – V = Technical components
 - Chapter VI – Programme management
 - Chapter VII – Planning, M&E, learning, KM and communication
 - Chapter VIII – Financial management
 - Chapter IX – Procurement
 - Chapter X – Costs and financing
4. Appendix include ToRs of PIU key positions, proposed M&E formats, outlines of first AWPB, first procurement plan and detailed cost tables.

II. Overall programme framework

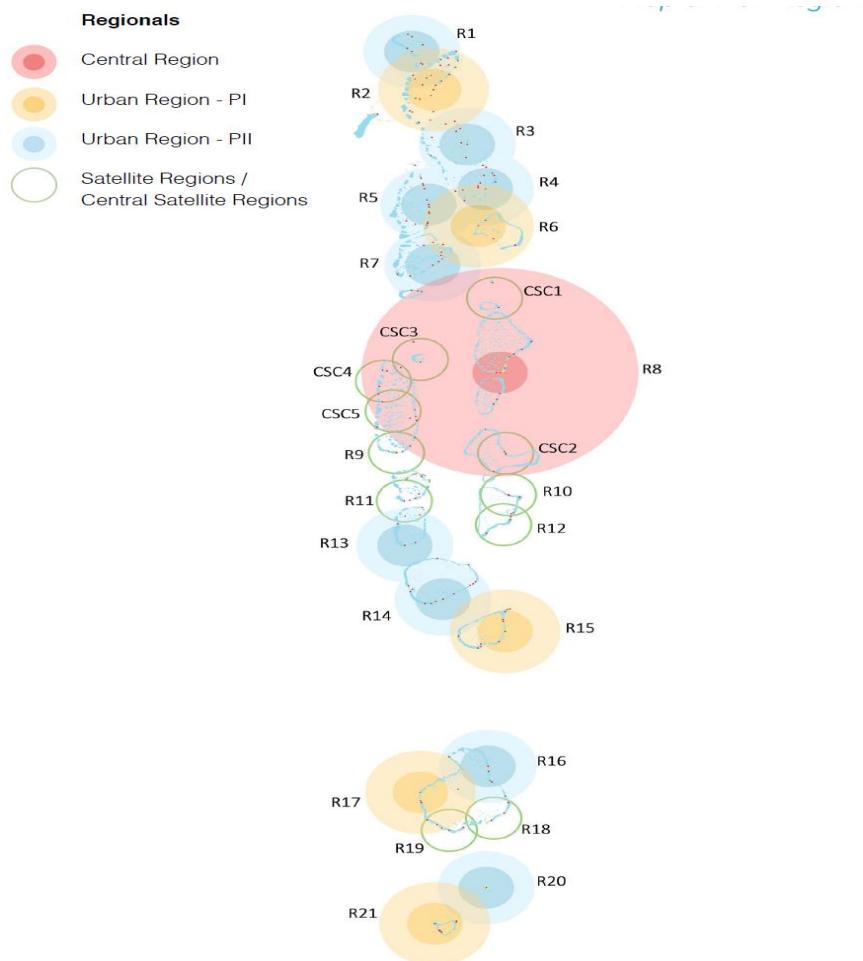
A. Goal and objective, programme area

5. **The programme's goal** is to sustainably increase the incomes, food security and nutrition status of small farmer households.

6. **The development objective** is the strengthened enabling environment for sustainable and climate-resilient agriculture. This objective will be achieved through policy refinement, strengthened institutions and services, enhanced agricultural technologies and better access to financing and markets for small farmer households.

7. **Programme area.** GoM is presently developing a National Spatial Plan (2020-2040) with the objective of reducing disparity among the capital and regions, facilitating effective regional development, providing affordable transport connections to communities, promoting economically sustainable infrastructure development and improving island-level livelihoods to create prosperous societies. The Spatial Plan will be based on growth hubs with the Male' area being the central hub and five regional hubs, nine sub-regional hubs, three central clusters and six satellite clusters. MAP will be articulated within the National Spatial Plan as part of the alignment with government development strategies.

Figure 1: Spatial Map for Maldives Strategic Action Plan



8. The programme will be of nation-wide scale, cover all regional and sub-regional hubs, clusters and islands where agriculture is undertaken by small farmers. The main programme hubs for programme activities are in region 1-3 are Haa Alif Hoarafushi for region 1. Haa Dhaalu Vaikaradhoo

for region 2, and Shaviyani Milandhoo for region 3. Each of these hubs will serve 8, 9 and 9 inhabited agriculture islands respectively. Specifically under different technical components:

9. *Component 1 of Enabling policy, institutions and services* will be nationwide in scope covering all 19 atolls, 21 regions covering 188 inhabited islands of these 98 are inhabited where agriculture is practised on around 800 registered hectares. Also belonging to the programme area is 50 uninhabited islands leased for commercial agriculture, with a total of 956 hectares of land of which 24 islands are actively doing agriculture on 582 hectares of land.

10. *Component 2 of Climate smart production* will initially focus on region 1-3, covering 3 atolls and 40 inhabited islands. Of these, 26 are inhabited agriculture islands with 280 hectares registered land cultivated by 2,150 registered farmers, and 85 hectares cultivated by 645 non-registered farmers. Within this production area there are 6 active commercial islands cultivating a total of 250 hectares.

11. *Component 3 of Market connection* will initially focus on regions 1-3 during the first two years and then expand to 4-7 and eventually cover the whole country.

B. Target groups and targeting

12. **Target groups** are small farmers who are constituted of different segments, including men, women and youth belonging to households of different socio-economic categories. With a considerable socio-economic and socio-cultural divide between rural and urban populations, also with respect to gender and age, small farmers who depend mainly on agriculture for their livelihood are economically one of the most vulnerable groups in the country. Analysis of poverty correlated with economic sector indicates that those working in the agriculture and fisheries sectors are far more likely to be poorer than those in industry or services. The Household and Expenditure Survey of 2016 found 8.2% of the population to be living below the national poverty line. However, regional disparities are significant; poverty incidence was only 1.7% in Male but 12.8% in the atolls. Urban-rural disparities are also striking; it is estimated that rural poverty is three times higher than urban poverty. The situation is worse for women with a high rate of divorce combined with limited employment opportunities contributing further to their level of impoverishment.

13. *Women* continue to be an important proportion of the active labour force in agriculture; they are also important actors in achieving food security and improved nutrition, the programme will pay special attention to the women's participation in the programme activities and their access to opportunities of livelihood improvement and their sharing of generated socio-economic benefits. Programme direct support to participating individuals will be inclusive and gender sensitive, to be reflected from training, involvement in enhanced production, adoption of introduced technologies, market connection, access to inputs and finance. A gender strategy will be defined by the programme and its associated action plan elaborated and implemented.

14. *Youth* will be another important segment for special attention, as their engagement is crucial for the future of agriculture in the country. Sampled visits indicated that the youth constitutes 20% of the active labour force in the rural community. Rural youth may be more attracted by labour or employment migration to the urban areas, as they are among those who find difficult to be involved in agriculture due to the lack of assets and skills. However, the youth are motivated and dynamic; inclusive and tailor-made measures can turn them into viable socio-economic actors. The programme will explore opportunities of engaging the youth in interventions related to agribusiness development, agri-technologies and knowledge transfer, management of modern agriculture, market linkage and IT technologies in support of production and post-production management.

15. **Geographic targeting strategy.** In light of the above, the programme will apply a geographic targeting strategy to target all the small farmers in the country, adopting an inclusive targeting approach that is gender and youth sensitive at the level of beneficiary participation in order to ensure the equitable access to development opportunities and resources for the disadvantaged groups.

16. Specifically, under the technical components:

- (i) *Component of Enabling policy, institutions and services* will benefit with its strengthened service support system approximately 10,170 farming households, of which 7,800 are registered and 2,370 non-registered. The programme direct interventions will reach out to 6,000 farmers of which at least 53% should be women, including household member the total is 31,800 persons. 20% are estimated to be youth;
- (ii) *Component 2. Climate smart production* will initially focus on region 1-3. Out of the total of 2,870 farming households, the programme will reach out to more than 2,100 farming households totalling about 14,000 household members. 53% of them are estimated to be female; and 20% youth.
- (iii) *Component 3 of Market connection* will benefit the farming and agribusiness community as a whole with its initial focus on regions 1-3 during the first two years and then expand to 4-7 and eventually cover the whole country.

17. **Gender targeting.** The programme's gender targeting is integrated into the overall programme targeting strategy and it aims to foster an enabling environment of equal opportunities for men, women and youth for their meaningful participation at both implementation and benefit levels. The strategy will be implemented through measures integrated into interventions under the four components including a position of targeting and gender specialist at both PIU and the technical team, and a gender development action plan for execution once the PIU and its technical team's staffing completed. This will mainly help pursue the informed actions to achieve: (i) increase in gender awareness for programme staff and participating agencies and business partners at all levels; (ii) integration of gender analysis and sex disaggregated targets and data into the programme M&E system including its planning and reporting; (iii) increase in authoritative possibilities and number of women and youth who have the adequate attributes necessary for leadership positions; and increase in the ability of rural women and youth to access and manage resources and agricultural services.

C. Programme guiding principles for implementation and logic model

18. **Operational approach and component mutual leverage.** The activities under the three technical components will be implemented in 26 islands under the three hubs mentioned above. Component 3 will leverage the support provided to 2,150 farming households under components 1 and 2 through targeted market linkage for additional 3,850 farming HH in the remaining country. The component operational targeting approach will be market-led: focusing on (i) agriculture produce with the biggest demand; (ii) clustering of island around three main hubs in the north to facilitate scale of production and enhance logistic; (iii) use of link farmers in conjunction with AICT and visiting advisors for rapid dissemination of knowledge and technology; (iv) linking island cluster/forums with markets; and (v) develop appropriated financial loan products.

19. **Gender targeting.** The programme's gender targeting is integrated into the overall programme targeting strategy and it aims to foster an enabling environment of equal opportunities for men, women and youth for their meaningful participation at both implementation and benefit levels. The strategy will be implemented through measures integrated into interventions under the four components including a position of targeting and gender specialist at both PIU and the technical team, and a gender development action plan for execution once the PIU and its technical team's staffing completed. This will mainly help pursue the informed actions to achieve: (i) increase in gender awareness for programme staff and participating agencies and business partners at all levels; (ii) integration of gender analysis and sex disaggregated targets and data into the programme M&E system including its planning and reporting; (iii) increase in authoritative possibilities and number of women and youth who have the adequate attributes necessary for leadership positions; and increase in the ability of rural women and youth to access and manage resources and agricultural services.

20. **Youth** are motivated and dynamic; inclusive and tailor-made measures can turn them into viable socio-economic actors. The programme will explore opportunities of engaging the youth in interventions related to agribusiness development, agri-technologies and knowledge transfer, management of modern agriculture, market linkage and IT technologies in support of production and post-production management. As concrete measures: (i) youth participation will be recorded and reported in the M&E system; (ii) youth will be encouraged to take active part in adoption of technologies and GAPs under components 1 and 2, (iii) youth will be given equal access to opportunities in activities of identification and recruitment of farmer forum leaders and ELFs, (iv) youth will be encouraged to take active part in participating in agribusiness supported by the programme, especially in production and marketing areas where modern technologies and IT tools are introduced.

21. **Climate-smartness and resilience.** The programme will introduce a number of climate-smart interventions, such as water harvesting and selection of climate resilient varieties and use of grafting, use of hydroponic and drip fertigation, and introduction of agroforestry. The programme will focus on biological control agents and IPM minimising use of pesticides which will be managed through the introduction of MGAP.

22. The programme will also initiate screening and developing of dwarf coconuts for multiplication and replanting of old senile plantations across islands. The dwarf type is higher yielding and withstands storms better than the tall varieties and it is also easier to control the Rhino Betel which is a problem because large number of senile coconuts. The project will also assist to commercialise the most suitable wild nuts and fruit by making planting material available and introduce as mix cropping with coconuts. The coconut plantation will also be used for cultivating legumes to be composted for field application to reduce imports of manure and fertilizer. These interventions will both be climate smart and having an environmental positive impact on reducing costal erosion, improve soil productivity and water holding capacity and generate income for framers in the Islands.

23. **Nutrition sensitivity.** The micronutrient survey of 2007 found micronutrient deficiencies among children, especially deficiencies in iron, zinc and Vitamin A to be of significant concern. The same study also found that overall, 38% of women were iron deficient and 26.8% were found to have zinc deficiency and 4.7% women and 39.3% women have severe and moderate vitamin A deficiency respectively. The micronutrient deficiencies are due to low consumptions of vegetables as part of limited availability, particularly in the northern part of the country.

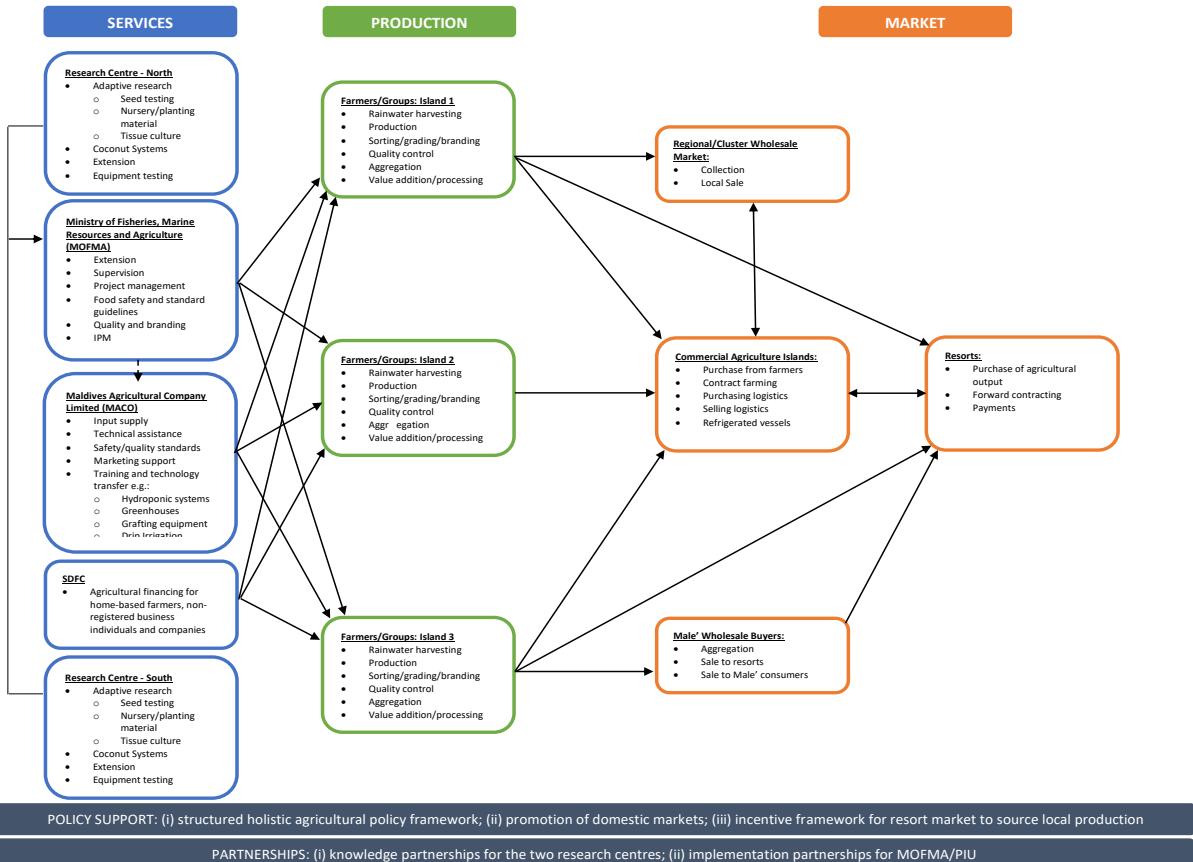
24. The programme's support to increase production of vegetable, fruits and nuts (both indigenous and conventional) and root crops will increase availability of vegetables, fruits/nuts and root crops. Additional intake of vegetables, fruit/nuts and root crops can lead to reduced micronutrient deficiencies, especially among children and women.

25. For vegetables the focus will be tomato, eggplants, okra, squash, pumpkin, different lettuce, cabbage, chilli, bell pepper, microgreen, cucumber, herbs, leeks, onions, watercress, broccoli Raba, string beans and chives. Fruit to which will be supported under the programme are papaya, banana, citrus, coconuts and mango. Support to root crops will be focused on taro, yam and in particularly sweet potato.

26. Support will also be provided to preserve suitable vegetables, fruits and nuts. Within the agroforestry system, the programme will identify most suitable fruits and nuts for fresh consumption and for preparation of preserved food and for medicinal use.

27. In close consultation with the Ministry of Health, the programme will seek to map the area where cultivation of specific vegetable, fruit/nuts and root crops be intensified to address micronutrient deficiencies. The programme will also work closely with Ministry of Health to develop appropriate training courses and materials to raise awareness and understanding of nutrition issues, among the target group of the programme.

28. **Logic model.** Following is the programme logic model that shows the interlinkage and mutual leverage between services, production and market.



III. Component 1 – Enabling policy, institutions and services

A. Area and technical targeting

29. This component aims to achieve the expected outcome of increased productivity of agriculture commodities. To achieve this, support will be provided to establish conducive policies and strengthened institutional capacity of MOFMRA and its Agriculture Research Centre (ARC) in Hanimadhoo Island in conducting quality adaptive research for generation of climate resilient recommendations for planting material, husbandry practises and new production systems like greenhouses, hydroponic systems, closed vertical hydroponic units, drip fertigation systems, and grafting equipment. Staff of the MACO, currently under the process of establishment, will also be trained in providing high quality and effective supply of agricultural inputs and equipment for new production systems to the smallholder farmers, and disseminating MGAP in conjunction with sustainable, climate-smart informed input management.

30. This will lead to transfer of production technologies and MGAP to the 26 inhabited islands and 6 uninhabited commercial agricultures islands in region 1-3. These islands will be clustered around 3 hubs including: (i) Haa Alif Hoarafushi for region 1; (ii) Haa Dhaalu Vaikaradhoo for region 2; (iii) and Shaviyani Milandhoo for region 3. Each hub is serving 8, 9 and 9 islands respectively and project activities under each hub will be managed by an agriculture advisor from MACO. Each island under the hubs will form an island farmer forum which will be the focal point for decisions on crops to be produced, staggering and appointing Extension Link Farmer cum input retailer. The ELF will receive technical capacity building and financial support to establish agricultural retail enterprise. Results from ARC's adaptive research will be validated through field trials/demonstrations in a typical island under each project hub. It is estimated that 2,150 farming HH across the 3 northern regions will benefit and 3,850 from the remaining regions will benefit from the component interventions. Farmers from region 1-3 will receive direct support under the project and the remaining regions will receive direct support through MOFMRA and MACO. MOFMRA and MACO will mirror the extension link farming mode introduced by the project in region 1-3. The projects will provide training to the six staff of ARC, and six staff of MACO. Three of MACO's staff will be stationed at each of the northern three regional project hubs and the remaining will be provide services to the remaining regions. The ELF on each of the 26 islands under region 1-3 will also receive continues training under the project. The ELF from each of the 3 islands selected for validation of adaptive research results will be trained in conducting on-farm trials/demonstrations, farmers field schools and farmers field days. ELFs for the remaining regions will be trained by MOFMRA and MACO.

31. **Farmer targeting.** The target group are 6,000 farming households of which 55% has to be women and 10% youth and the remaining can be men. Special focus will give to all poor farming HH on the initial production islands in the northern three regions.

B. Subcomponent 1.1. Knowledge and technology

32. **Output 1.1. Policy knowledge products on sustainable and climate-resilient agriculture** will be completed (research, study, strategy, bylaw) based on the thematic and sector issues that will promote the country ownership and enabling environment for agribusiness.

33. Activity 1.1.1 Enhanced participation of the agribusiness community in policy process. This activity will promote the inclusion of agribusiness players, supporters and influencers in policy process with the regulators such as MOFMRA. Thematic and sector issues of policy and strategic interests will be shared and consulted with the agribusiness community for the sake of better responsiveness to their interests and concerns. Partnership with policy research divisions or institutions will be established in order to carry out relevant researches and studies in support of the agriculture-related policy dialogues in the country. The project's interventions in linking MSME financing to production and market (partnership between MOFMRA, MFLC and SDFC), operational procedures on distribution and application of quality inputs (partnership between MOFMRA and MACO) represent good potential of case studies in support of the further formulation of sector or sub-sector standards and regulations

where necessary. The project will provide financing to support related consultancy and training in this regard.

34. Other possible topics for policy dialogue may include: (i) establish regulations governing ground water extraction; (ii) Improve the present weak regulation for import of agriculture crop produce can cause serious damage to both reputation of locally produce as well as imported produce; (iii) establishing an ISO 17025 accredited laboratory for analysis of residue of pesticide and heavy metals; (iv) Presently there are no guidelines on the safe handling, use and disposal of chemicals in the Maldives and databases on chemicals are very weak this needs to be addressed in complementarity with introduction of MGAP.

35. The MAP TA management support and the project director will take the lead in prioritising the most important policies. The dialogue with relevant government institutions will be evidence-based policy papers prepared by assistance from independent hired experts. New policies and regulations will be accompanied by awareness building activities to share the analysis and recommendations and ensure continuous follow-up of the policy recommendations.

Activity	Timeline	Responsible Party
1.1.1	Throughout the project implementation as patient policy issues related to project long term sustainability is identified	Project Director and hired TA for preparation of policy papers.

36. **Output 1.2. Upgraded capability of generating knowledge and technology** by the ARC in Hanimadhu Island including include: (i) new facilities able to examine water, soil, tissue and plant diseases; (ii) greenhouse for humid and hot climate fitted hydroponic moving planting gutter using minimal space for walk ways; (iii) insulated house with vertical production under artificial light; (iv) different type of net houses; (v) machinery and apron for compost making; (vi) open field hydroponic systems; (vii) reagents for analysis, fertilizer, pest control agents (chemical and biological); (viii) tools such as refractometer, tissue and soil nutrition analysis meter, insect catch plates and microscope; (ix) open field drip irrigation; (x) HDPE drain cell/storage and rainwater collection sheet with pump sump and pillow water bladder storage tank; (xi) grafting equipment; and (xii) photovoltaic system with battery backup. Related activities can be outlined as follows:

37. Activity 1.2.1. Upgrade laboratory: The MAP will finance new equipment to upgrade the existing laboratory at the ARC. The supplier of the equipment will provide ARC staff the required training in using the equipment and maintenance. Follow up training will be undertaken by Maldives National University on a need basis. Hired TA hired by MAP will also provide training to the ARC staff in establishing protocols and test methodologies.

38. Activity 1.2.2. Greenhouse and enclosed vertical houses fitted hydroponic systems: The suppliers of new production systems will be charge with training the relevant staff at the ARC in their operation and maintenance. The project engaged to support the ARC will also provide training and develop production protocols for various crops in compliance with MGAP. In turn the ARC will train MACO staff and farmers investing in these production systems.

39. Activity 1.2.3. Different type of net houses: The staff of ARC have a good understanding of designing, maintaining and using net houses for different production systems. In addition to existing knowledge the TA under the project will provide assistance to develop the adaptive research programme and the knowledge required for specific crops.

40. Activity 1.2.4. Machinery and apron for compost making: TA support to ARC will assist with the design and appropriate production of biomass to be cultivated for compost. The cultivation of biomass (legumes) will be agroforestry based. It will also be promoted in replanted coconut plantations and where feasibly also introduced in the open field cropping system.

41. Activity 1.2.5. Open field drip/hydroponic systems: The supplier will provide the training in the installation, maintenance and use. In turn the ARC will transfer the knowledge to the MACO agricultural advisors, dealers, extension link farmers and to farmers.

42. Activity 1.2.6. Field test kits: The MAP, TA service to the ARC will provide training in the field test kits and from the ARC it will be disseminated to extension link farmer.

43. Activity 1.2.7. Production inputs: The recommendations developed by ARC and validated on one island under each project hub will be taught to extension staff, extension link farmers cum input retailers. Appropriate written/illustrated material will be developed and used as handout and for drag down on the AICT mobile app. The TA assisting ARC will support to undertake this task.

44. Activity 1.2.8. Rainwater drain cell/storage and rainwater collection sheet with pump sump and pillow water bladder storage tank: The supplier of these products will provide training to the ARC on how to install, maintenance and use, and the ARC will train MACO staff, extension staff and ELF/input retailers. The TA engage from time to time in supporting ARC will also provide assistance.

45. Activity 1.2.9. Grafting equipment: Grafting of fruit and vegetable will be critical to optimise yields to make planting material more climate resilient. TA under MAF will train the ARC staff, MACO staff link farmer/input retailers.

Timeline and Responsible Parties for Implementation

Activity	Timeline	Responsible Party
1.2.1	Immediately after project effectiveness. Follow up training on a need basis	Company supplying equipment, MAP TA and Maldives National University
1.2.2	Immediately after project effectiveness for ARC and each time when farmers buy a production system from MACO	Company supplying equipment, MAP TA and MACO staff together with ELF cum input suppliers
1.2.3	Immediately after project effectiveness for ARC and each time farmers buy a screen house from MACO	ARC TA will provide support for preparing protocols for adaptive research. MACO staff will train farmer in the use of screen houses
1.2.4	At the ARC immediately after project effectiveness. Each time a entrepreneur invest in compost making	TA for ARC, and ARC staff will train MACO staff and ELF com input suppliers
1.2.5	At the ARC immediately after project effectiveness. Each time a entrepreneur invest in hydroponic	Supplier of the hydroponic system and TA for ARC, and ARC staff will train MACO staff and ELF com input suppliers
1.2.6	When field implementation commence around 6 months after project effectiveness	The TA will train ARC staff who in turn will train MACO staff and ELF cum input retailers
1.2.7	Immediately after project effectiveness	Training material will be developed by local TAs
1.2.8	At the ARC immediately after project effectiveness. Each time a farmer invest in rainwater harvesting and storage	Supplier of the system and TA for ARC, and ARC staff will train MACO staff and ELF com input suppliers
1.2.9	At the ARC immediately after project effectiveness. At field level each time a farmer engage in grafting	Supplier of the equipment and supplier of the root variety planting material.

46. **Output 1.3. Packages of recommendations developed for enhancing economic return** for small holder farmers. This will be achieved through adaptive research including: (i) identify best varieties for different crops; (ii) hydroponic fertilisation for greenhouse, closed system and field systems; (iii) drip fertigation for open fields; (iv) level of compost to use for crop production in open field; (v) develop IPM recommendations for the various crops in greenhouse, closed system and open field; (vi) develop organic pest recommendations for the various crops in greenhouse, closed system and open field; (vii) Prepare farm budget based on field records for each recommendations developed; and (viii) prepare promotion material videos, pamphlet, prospectus for different systems. Main activities are summarized as follows:

47. Activities 1.3.1. Development and training in conducting adaptive research: The TA under MAP will train ARC staff to conduct on station adaptive research and off station validation trials and undertake farmer's acceptability and market evaluation of well performing varieties. Other tested technologies will be evaluated jointly by the ARC and farmer in the 3 selected test islands before disseminated across all islands. The evaluation will be based on well prepare protocols measuring parameters related to yields, palatability, use of water from aquifers, rainwater harvest, pesticide use and effect on the environment and overall emersion foot print.

48. **Activities 1.3.2.** Knowledge management: The project will publish its finding and recommendation on its home webpage, prepare training videos, leaflets and prospectus with detailed production guides and financial analysis and financial services possibility and its requirements. A TA will be engaged to establish the KM framework, methodology and the material.

Timeline and Responsible Parties for Implementation

Activity	Timeline	Responsible Party
1.3.1	Immediately after project effectiveness.	TA will train ARC staff
1.3.2	Immediately after project effectiveness.	TA will develop the KM framework

C. Subcomponent 1.2 – Input supply

49. The Ministry of Fisheries, Marine Resource and Agriculture and the Ministry of Economic Development are currently in the process of establishing the Maldives Agriculture Corporation (MACO). MACO will be a legal registered PPP LTD owned by government and private enterprises under the patronage of the Ministry of Economic Development. MACO will be mandated to ensure availability and supply of high-quality consumable inputs, equipment and machinery for the agricultural sector in the country. MACO will also develop mechanism that will ensure domestic produce competitiveness with imports of similar produce.

50. MACO will be supported to build its management capacity to meet its scope of business, especially in its operation of importing and distributing appropriate high quality inputs such as planting material, and initial rootstock for grafting, fertilizer and pest control agents for conventional and organic production, power tillers and implements, tropical natural ventilated and forced ventilated green/screen houses with water harvesting systems, and hydroponic growth vessels with shade nets, solar/photovoltaic systems, drip fertigation and water harvesting liners. The project will also support MACO in the procurement of simple processing equipment for commodities such as coconut chips and UHT coconut water, VCO, pickles, jam and juice. MACO will sell these inputs and equipment to farmers, ideally at market rates. The project will provide the initial capital to MACO to procure an initial stock of inputs and equipment; MACO would thereafter operate the scheme on a financially sustainable basis. MACO will further explore the possibility of seeking to produce and procure some inputs locally (for instance organic inputs, seeds, planting material, compost). Main activities are summarized as follows:

51. **Output 1.4. New technologies and improved inputs transferred to smallholder farmers.** Transfer of knowledge and technologies will entail: (i) MACO hire and train 6 agronomist/extension staff with project support; (ii) MACO staff provide project awareness among farmers in participating Island; (iii) MACO assist farmers form institutional frame work, e.g. island farmers forum for decision on type of produce to ensure scale of production; (iv) MACO assist farmer forum to select an ELF (farmer to farmer) who will also double as retailer of input and equipment; (v) MACO train selected ELF; (vi) TA under the project develop the MGAP protocols for various crops produces and hand book for MGAP implementation; (vii) TA assist to establish an agriculture Information and Communication Technology and prepare illustrated training material also for use during live training. Main activities are summarized as follows:

52. **Activity 1.4.1.** Capacity building: TA under MAP will train the MACO staff in validation of adaptive research results, advisory/extension service using LEF. The staff will also participate in conducting field validation trials/demonstration providing them with in-depth knowledge of recommendations and new technologies extended to farmers.

53. **Activity 1.4.2.** Awareness and Wealth ranking: The MACO staff will undertake to conduct detailed awareness of MAPs activities in a phased manner. The awareness will focus on services available under the project and partner financial institutions providing financial service to project target group. During the awareness wealth ranking will also take place. The ranking of village HH will include the following wealth classes Better off HH, Moderate off HH, Poor HH, Very poor HH and women headed HH (also grouped according to wealth).

54. Activity 1.4.3. Island farmer's forum: The staff of MACO will assist island to form a farmer's forum which will be the focal point for planning production of commodities and staggering, introduction of MGAP and group certification, extensions service, linkage with financial institutions, and linkage with market and establish contract farming with commercial agricultural islands, resorts, wholesalers in Male and also sales to MACO. The forum will also assist in selecting ELF cum input retailer.

55. Activity 1.4.4. Training of ELFs: The ARC/MACO will provide training in production techniques, financial literacy, MGAP, water management, business planning, and use of ACTI to be developed by MAP and use of the recommendations developed by the ARC.

56. Activity 1.4.5. MGAP protocols for various crops and handbook for MGAP implementation: TA under MAP will assist to develop the protocols and handbooks and train the master trainers of MGAP to be appointed by MOFMRA's. MGAP can be defined as optimisation of technologies and resources for sustainable agriculture and food safety. There are costs related to introducing GGAP as well as recurrent cost which will initially be born by MAP and eventually by MACO. The initial cost is related to farm assurers' assessing the gaps to be closed for achieving MGAP certification, training of members of farmers forums on each island to close the gaps and meet the MGAP management requirements and the cost of audit and certification. There are also cost related to soil and water analysis and construction/modification of storage facility of chemicals and fertilizer. The recurrent cost is annual audit and renewal of certification. There are also savings, which can generate benefits in excess of the cost e.g. Vietnam report that on average farmers generates USD 1,250 per Ha in net benefit from VGAP.

Activity	Timeline	Responsible Party
1.4.1	Upon commencement of field activities 6 months after project effectiveness	TA and MACO staff
1.4.2	Upon commencement of field activities 6 months after project effectiveness	MACO staff
1.4.3	Upon commencement of field activities 6 months after project effectiveness	MACO staff
1.4.4	Upon commencement of field activities 6 months after project effectiveness	ARC and MACO staff
1.4.5	Upon commencement of field activities 6 months after project effectiveness	TA, ARC and MACO staff

57. Output 1.5 Agriculture Information and Communication Technology (AICT) Service Established.

58. Activity 1.5.1. Agriculture Information and Communication Technology (AICT) and illustrated training material: The programme will hire a service provider to develop a mobile app for AICT and relevant training material for farmers to drag down. The app will also have a marketing platform for interactions between producers, buyers and input suppliers. The programme will negotiate with mobile service providers to share the income from SMS traffic to the app, ensuring sustainability.

Activity	Timeline	Responsible Party
1.5.1	Immediately upon MAP effectiveness	Agriculture ACTI owner from neighboring countries could adopt their system to Maldives.

IV. Component 2 – Climate-smart production

59. This component aims to achieve the expected outcome of improved productivity by the adoption of new and improved existing technologies, good practices and inputs. Further to the training and transfer under component 1, farming households from region 1-3 will begin to receive the first services under component 2 during the first part of PY2.

60. **Output 2.1. Beneficiaries trained on production practices and technologies.** Under the component, climate-smart production of high value commodities will be undertaken by farmers using inputs supplied by MACO based on the seeds and technologies/production packages developed and validated by ARC, and agricultural financing from SDFC and MFLC. Irrigation water supply will typically come from investment in rainwater harvesting and storage systems. Farmers will be trained in production techniques, MGAP standards, Codex Alimentarius and preliminary steps to HACCP if required, branding, sorting and grading, quality control, aggregation, and basic processing for value addition where applicable. Project regional hubs and islands with substantial aggregation of output may be supported with hybrid (solar/battery) pre-cooling facilities. Main activities are summarized as follows:

61. Activity 2.1.1. Training of farmer's in basic crop production and MGAP. The MACO advisers will develop a training schedule based on the MGAP crops protocols and mentor the ELF undertake training of farmers. Farmers will first receive crop based basic training according to the crops selected for production from the MGAP crop protocols. This will be followed by training farmers on MGAP leading to audit and MGAP certification. Training of migrants hired by the farmers and those who have rented land to undertake farming will also receive training and other project services.

62. Activity 2.1.2. Training of farmers in quality. Sorting produce according to cosmetic and qualities according to Codex Alimentarius, ensure a uniform product for the market allowing comparison with imported produce. This will also feed into branding of produce form Maldives.

63. Activity 2.1.3. Technical training of relevant farmer in operation and maintenance of greenhouse, closed vertical production systems, hydroponic, open field drip and hydroscopic systems, walking tractors, photovoltaic system..

64. Activity 2.1.4. Water harvesting and storage. Best location, Installation and maintenance of water harvesting and storage systems.

65. Activity 2.1.5. Cold storage. Train operators in precooling, refrigeration, hygiene, and maintenance of cold storage facilities.

66. Activity 2.1.6. Compost and mulching. Train farmers in the importance of using compost in open field, how to make compost, apply it and adjust chemical fertilizer accordingly. Using compost and biodegradable polythene as mulching.

67. Activity 2.1.7. Grafting. Teach interested farmers grafting to improve climate resilience (resistance to pest and disease, improve heat tolerance and tolerance of difficult growing conditions). The ARC will also make grafted planting material available to MACO via its retail outlets.

Timeline and Responsible Parties for Implementation

Activity	Timeline	Responsible Party
2.1.1	Upon commencement of field activities 6 months after project effectiveness	MACO technical staff
2.1.2	Upon commencement of field activities 6 months after project effectiveness and ongoing	MACO technical staff
2.1.3	As and when required	MACO technical staff
2.1.4	As and when required	MACO technical staff
2.1.5	As and when required	MACO technical staff
2.1.6	As and when required	MACO technical staff
2.1.7	As and when required	ACR, MACO staff and ELFs

68. **Output 2.2 - Farmer production forums** will be organized in order to provide required quantity and quality of products in response to the market opportunities.

69. Activity 2.2.1. Island farmer forum. The MACO will assist farmers on island belonging to each of the three island hubs to form farmer forums. The island farmer forum will agree on commodity to be produced and staggering of production who and when and select the ELF cum retailer of inputs. One representative from each island farmer forum will form the hub farmer forum which will make recommendations regarding what island produces what commodity. A representative from each of the three hubs will represent farmer on MAP's steering committee.

70. Partnerships will be sought with NGO particularly regarding formation of farmer's forums. TA support related to preparation of training material will also be drawn from research institutions from neighbouring countries.

71. The expected benefits will not only be to the 2,150 participating farming households, but also have financial and economic impacts for the six commercial islands, three regional markets and one wholesale market in Male and four wholesalers companies.

Timeline and Responsible Parties for Implementation

Activity	Timeline	Responsible Party
2.2.1	Upon commencement of field activities 6 months after project effectiveness and ongoing till farmers forum established on all islands	MACO technical staff

72. **Output 2.3. Improved access to agriculture financing** (SDFC and MFLC). The SME Development Finance Corporation (SDFC) has been established in early 2019 as a specialized financial institution under the *State Trading Organization* plc to providing financial products and ancillary services to MSMEs and entrepreneurial start-ups with the primary purpose of easing access to finance for MSMEs. SDFC is under the patronage of the Ministry of Economic Development.

73. Maldives Finance Leasing Company Pvt Ltd (MFLC) has been in operation since June 2002. MFLC was an initiative of the International Finance Corporation and the Maldives Monetary Authority. The primary objective of setting up the company was to diversify the Maldivian financial sector. In April 2014, MFLC was acquired by Tree Top Investments Pvt Ltd, a company that was founded in 2013 by a group of successful businessmen with illustrious careers. MFLC's primary objective is to provide finance leases of movable assets to small and medium scale business enterprises in the Maldives

74. Since its start MFLC has primarily been engaged in providing finance leases of marine vessels mainly fishing boats with cold storage, plant, machinery, equipment, and vehicles to the commercial sector and recently in micro-financing of motorbikes, consumer durables to individuals. Further, the company provides home improvement loans as well. MFLC's products include Finance Lease, Hiya Faseyha, Salhi Lease, Direct Lease, Lifestyle Lease, V Lease, Debt Factoring and Housing Loans. MAP will seek collaboration with MFLC for Hire Purchase products for vessels with cold storage facilities. MAP will collaborate with MFLC for Hire Purchase products for vessels with cold storage facilities. It is anticipated that a total of eight vessels and five regional and sub regionals cold storages will benefit from this Hire Purchase partnership with MFLC.

75. Currently SDFC has developed and introduced six products, out of which 'Dhanduveri Nafaa' product is specifically for the agriculture sector and provides loans of MVR 75,000 for home-based farmers, MVR 500,000 for non-registered business individual, and MVR 2 million for companies and partnership business entities. These loan product was introduced in collaboration with the MOFMRA to help ease the access to finance for individuals and corporative societies within the agriculture sector. One of the key purposes include encouraging the current community to integrate technology into the various types of farming activities. As part of the conditions for access to finance, 20% equity by the applicant is required and the collateral means needs to be valued at 120% of the loan amount. The assets procured from the loan will be regarded as collateral.

76. As the SDFC is still in its early operational phase financial services to the SME sector in terms of service range and coverage is still limited. The project will provide technical assistance in strengthen its operational capacity, which in return help improve and increase its lending portfolio to the agribusiness in the country.

77. Activity 2.3.1. Building SDFC and MFLC capacity in agricultural financing. The project support will include: (i) TA for developing new financial products where required; (ii) training of relevant SDFC and MFLC staff in using the new financial products; and (iii) training relevant SDFC and MFLC in assessment agriculture business plans. The project support will focus on building SDFC's and MFLC's capacity in providing diversified services and products in agricultural financing, such as value chain financing (tri-partite arrangement involving bank, producer, buyer where the forward contract serves as collateral and repayments are made from the buyer to the bank on behalf of farmers), receivable financing (where a company uses its receivables as collateral in a financing agreement), and supplier or inventory credit. In addition, the feasibility of introducing mobile technology-based payment services will also be explored

78. Activity 2.3.2. The PIU Business Development Specialist and MACO's staff will support farmers and enterprises develop business plans. The poor beneficiaries represent 15% of the target borrowers and matching grants for this category will be provided to substitute own equity contribution amounting to 20% of SDFC's loan. The remaining 1825 estimated borrowers will contribute their own 20% equity as part of the required investment capital. It is anticipated that SDFC's will finance loans to the tune of USD 7.5 million, of which USD 5 will be incremental financing and USD 2.5 million will be based on reflows.

79. Activity 2.3.3. The PIU business development specialist will support preparation of feasibility studies/business plans for the estimated eight enterprises investing in cargo vessels with cold storage and the five enterprises investing in regional and sub-regional cold storage facilities. If financial viable these enterprises will receive 20% matching grant as down payment for the respective investment in the form of a Hire Purchase products from MFLC. MFLC will be the legal owner of the assets until hire term has matured in compliance with HP contract; hereafter ownership will be transferred to the investor.

Timeline and Responsible Parties for Implementation

Activity	Timeline	Responsible Party
2.3.1	Upon commencement of field activities 6 months after project effectiveness and ongoing till needs are met	Project TA and PIU Business Development Specialist
2.3.2	Once MAPÉPIU – SDFC agreement signed and credit funds available	Project TA and PIU Business Development Specialist, MACO involved staff and SDFC credit officers
2.3.3	Once participating enterprises identified	Project TA and PIU Business Development Specialist, MACO involved staff and SDFC credit officers, MFCL

V. Component 3 – Market connection

80. One of the biggest constraints along the value chain is market linkage. Most commonly used sea vessels for interisland cargo transport are the wooden mechanised ‘dhoanis’ boats totalling 6,295 and ranging in size from small one man fishing boat to 30 to 40 meter long boats with a DWT of up to 160 Mt. Most of the dhoanis are fishing vessels but several hundred are used as cargo boats, the smaller once between islands close to each other, and larger vessels ply the waters between regions and Male. Most resort island have a large vessel fitted with cold rooms for collecting supplies once or twice a week from Male including meat, dairy products, fish and vegetables. Some resorts also use these boats for collecting vegetables from airport islands, regional and sub-regional islands having a vegetable wholesale market. Most of the island classified as commercial agricultural island (6 active agriculture commercial islands in region 1-3 and xx in the remaining regions) also have refrigerated cargo vessels mainly used to take vegetable to Male and to a less extent to resort islands. Some of the commercial agricultural islands also engaged in contract farming on agriculture inhabited islands.

81. Despite this fleet of refrigerated vessels most of the xx inhabited island where agriculture is practised are having unreliable transport services and mostly as ambient cargo, resulting in huge losses, rendering agriculture production unprofitable. This situation makes transportation of agriculture produce one on the most limiting factors along the value chain.

82. **Output 3.1. Supply contracts established between producers and private companies** will contribute to formalize the business relationship between organised production, transportation and markets.

83. The project will assist to overcome this limitation in the following ways: (i) link commercial islands with agriculture inhabited islands for contract farming; (ii) support the project hubs establish cold storage facilities and to increase availability of agriculture produce for domestic population, and also link to tourist resorts, regional, sub regions and Male markets; (iii) call for interest among ‘dhoanis’ cargo vessels to upgrade their service with cold storage; (iv) and if still a need for additional transport services during third year of implementation the project can reallocated funds for procuring up to three refrigerated vessels which can be sold to interested enterprises on Hire Purchase basis.

84. Activity 3.1.1. The PIU Business Development Specialist will actively support linkage arrangements in the form of contract farming between agriculture commercial islands and inhabited agriculture islands. To agricultural commercial islands will be provide incentives in the form of: (i) matching grant for upgrading cold storage on cargo vessels enabling the increased volume from agriculture inhabited islands to be transported to markets; (ii) upgrade production facilities on the agriculture commercial island to be used as training facilities for farmers; (iii) decreasing financial support for hiring embedded supply chain manager providing support to the farmers at inhabited islands; and (iv) staff of the islands can receive training for introduction of MGAP. The PIU Business Development Specialist will seek co-financing for above from the MFLC and from SDFC.

85. Activity farmers 3.1.2. The project will support private enterprises interested to establish Cold storage facilities at the three project island hubs, regional hubs and sub-regional hubs. The support will be in the form of matching grants, technical management training of operating the cold storage, MGAP training and MGAP certification. The PIU Business Development Specialist will seek co-financing for above from the MFLC and from SDFC as mentioned under activity 2.3.3.

86. Activity 3.1.3. The project will issue a call for interest among ‘dhoanis’ cargo vessels to upgrade their service with cold storage through matching grant, linkage to MFLC and from SDFC, MGAP training and MGAP certification. To qualifying for support the ‘dhoanis’ enterprise has to agree to service a specific number of islands on a pre agreed regular basis.

Timeline and Responsible Parties for Implementation

Activity	Timeline	Responsible Party
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3.1.1	Upon commencement of field activities 6 months after project effectiveness and ongoing till all islands have marketing linkage	PIU Business Development Specialist, MACO technical staff, ACI, MFLC, and SDFC
3.1.2	Upon commencement of field activities 6 months after project effectiveness and ongoing till all islands have marketing linkage	PIU Business Development Specialist, MACO technical staff, ACI, MFLC, and SDFC
3.1.3	Upon commencement of field activities 6 months after project effectiveness and ongoing till all islands have marketing linkage	PIU Business Development Specialist, MACO technical staff, ACI, MFLC, and SDFC

VI. Programme management

A. Start-up

87. **The programme's readiness** for operational effectiveness is subject to a number of steps as outlined below.

88. **The Financing Agreement (FA)** for MAP is expected to be negotiated in March-April 2020. Using the resources of the start-up facility; a number of steps are required to get the Programme underway.

89. **Establishment of PSC and PIU.** The GoM will confirm the establishment of MAP PSC and PIU by sharing the official decree or authorization.

90. **Recruitment of key PIU staff.** The attached PIM includes Terms of References and specifies required qualifications. For positions where no qualified government staff can be found or be freed from other duties qualified staff will be selected from the market. The Planning and Programme Coordination Section of MOFMRA is to lead the process for selection of key PIU staff under the guidance of the Permanent Secretary. The recruitment of all key PIU staff needs to be submitted to IFAD for no objection.

91. **Office facilities.** Office space needs to be availed within or in proximity of MOFMRA where the PIU can be housed for the full duration of the Programme. The office space should be able to accommodate the MAP's PIU and its operations, including meeting facilities

92. **Readiness of financial management**, accounting and procurement. The GoM will ensure the readiness in this regard in line with the Financing Agreement (FA) and the Letter to Borrower. (LTB).

93. **Annual Work Plan and Budget and procurement plan of first 18 months.** The PIU – once established – should submit review the two documents and make updates or revisions where necessary, submit to IFAD for prior review.

94. **Project Manuals.** The PIU needs to review and (where need be) revise the two draft manuals, viz.: Project Implementation Manual (PIM), Financial Management Manual (FMM), and submit the final versions to IFAD for approval.

95. **Conditions prior to the release of initial advance.** The PIU will comply with the possible conditions prior to the release of initial advance, which should be included in the FA.

96. **Start-up workshop.** Assuming adequate progress on the above, a start-up workshop is foreseen for May-June 2020. Aside from marking the start of the Programme, the workshop will be used to:

- (a) Take stock of preparatory activities till date;
- (b) Introduce the Programme to its key stakeholders at relevant levels;
- (c) Present, explain and discuss the implementation procedures, to the PIU staff and the key implementation partners.

97. The workshop programme will include dedicated sessions for financial management, procurement and M&E and KM among others.

B. Programme governance and steering

98. The overall responsibility for the MAP implementation will be assumed by the Ministry of Agriculture, Marine Resources and Agriculture (MOFMRA), which is the Lead Programme Agency.

99. The Ministry of Finance (MOF) will be responsible for ensuring timely flow of funds to MOFMRA for programme implementation. The Ministry of Economic Development (MED) will be responsible for guiding the setting up of MACO that will be a beneficiary recipient and implementing agency of the

programme. The Ministry of National Planning and Infrastructure (MONPI) will partner with the MOFMRA to set up the markets, cold storage facilities, and relevant infrastructure.

100. **Programme Steering Committee (PSC).** The Programme will be implemented under the overall direction of a Programme Steering Committee (PSC) chaired by the Permanent Secretary of MOFMRA and encompassing representatives from the related ministries such as MOF, MED, MONPI, MOE and other stakeholders that are related and relevant to the Programme. The PSC will meet at least bi-annually, and on ad hoc basis when necessary. The PSC will evaluate and approve annual work plans and budgets (AWPBs) and annual procurement plans, periodic progress reports, provides directives on strategic aspects of the implementation management such as due compliance and inter-agency coordination, and approve major competitive agreements and contracts. Special and ad hoc technical committees can be formed under the PSC upon needs to provide due guidance and bring in synergy with stakeholders and partners other than the identified implementing parties.

C. Operational management

101. **Programme Implementation Unit (PIU)** will be established in the Planning and Programme Coordination Section of MOFMRA and located within or in proximity of MOFMRA. The PIU will be responsible for the overall operational management and coordination of the programme implementation. A qualified Programme Director (PD) reporting to the MOFMRA Permanent Secretary, will be appointed to lead the PIU. Under the direction of the PD, the PIU will include a management team of government-seconded officers, support staff provided by the government, and supported by a programme implementation management agency, which will form a technical team in support of the PIU.

102. The PIU will assume the overall responsibility for programme management and coordination. Its specific key responsibilities are as following:

- (i) Ensure that the programme strategy is applied through the implementation of all activities,
- (ii) Coordinate the programming of planned activities under the programme,
- (iii) Prepare and consolidate AWPBs,
- (iv) Coordinate the timely and proper implementation of approved AWPBs by each of the implementing parties or line agencies,
- (v) Consolidate programme-related budgets, statements of expenditure and progress reports,
- (vi) Ensure timely programme M&E, progress reporting, and knowledge management,
- (vii) Preparing withdrawal applications,
- (viii) Ensure the undertaking of the annual auditing of the Programme,
- (ix) Serve as PSC Secretariat,
- (x) Assume the inter-programme coordination with other development programmes in the country and overseas where applicable, and
- (xi) Other mandates and tasks that the Government and IFAD agree to assign

103. **PIU staffing.** The PD will be composed of one (1) Programme Director, three (3) Component Coordinators/Specialists, one (1) Planning and Administrative Officer, one (1) Financial Management Officer, one (1) M&E and KM Officer, one (1) Procurement Officer, one (1) Targeting and Gender Officer deputed from the Government and assisted by support staff. The Government-seconded staff should meet the agreed relevant levels of qualification and experience as a condition of their appointment/deputation. Outlines of ToRs for PIU key positions are proposed as appendix 1.

104. PIU staff incentive mechanism. The purpose of the incentive package financed by IFAD grant is to provide a motivational and encouraging tool to PIU staff whose salaries are financed by MOFMRA as part of the government contributions. The incentive is an additional amount of payment given to the PIU senior and technical staff with their fixed agreed and fixed salaries and time of the year.

105. The incentive package is structured on the basis of quantitative and qualitative achievement of the annual work targets to be identified and agreed with each individual staff entitled to the incentive package, and individual work targets must be made in line to fully support the achievement of the AWPB of the period.

106. Positions entitled to the incentive package are as follows:

- Programme Director,
- Component Coordinators/Specialists,
- Planning and Administrative Officer,
- M&E and KM Officer,
- Procurement Officer,
- Targeting and Gender Officer.
- Financial Management (Executive) Officer,
- Accountant,
- Accountant assistant,

107. *Appraisal and approval.* The Project Director's performance will be appraised by the PSC and approved by the PSC Chairperson.

108. Component coordinators/specialists, Planning and administrative officer, Financial management officer, M&E officer, Procurement officer, Targeting and gender officer will be appraised by the Project Director, who recommends the performance rating and incentive categories to the PSC, or the PSC authorized special committee or PSC member for approval.

109. Accountant and accountant assistant will be appraised by the Financial management officer, who recommends the performance rating and incentive categories to the Project Director for approval.

Proposed rating categories and performance of available annual incentive budget

Categories	Outstanding	Excels	Proficient	Needs Improvements	Unsatisfactory	
Set quantitative targets achieved	100% ≥80%	<100% ≥80%	-	<80% - ≥70%	<70% - ≥65%	<65%
Set qualitative targets achieved (Brief comments)						
Areas for improvements and development						
Goals/objectives for next evaluation period						
Agreed/not agreed						

110. Maximum of annual incentive allocated to respective position will be set once the available annual budget is calculated and recommended by PSC to IFAD for No-Objection.

111. The incentive mechanism should be proposed by PIU and reviewed by HR and FM divisions of MOFMRA, before going to PSC for its recommendation to IFAD for No-Objection.

112. Technical assistance and technical team. The technical assistance to MAP will be contracted to provide technical support in daily operational management and coordination of the programme implementation. Three options were offered as options by the design mission to MOFMRA: (i) contracting of a UN agency such as UNOPS; (ii) contracting of a private sector consulting firm or NGO; or (iii) contracting of individual consultants by the PIU. Following extensive deliberation of the advantages and disadvantages of each option, the mission and MOFMRA agreed to select UNOPS for this purpose (subject to UNOPS agreement). UNOPS would provide a qualified and experienced Chief

Technical Advisor / Programme Management Specialist on long-term basis, and short-term technical specialists as required. The duration of this support would be two years, and would have the broader objective of strengthening programme management capacity within MOFMRA. During this first two years' period, MAP and especially the TA team will work to sensitize other development partners in search of additional funding to support continued TA till the programme completion.

113. Specifically, the TA will provide specialised managerial and technical support to the PIU, primarily in the area of developing the programme management systems and capacities as part of the institutional capacity building to MOFMRA under the programme framework, and support the programme progress and performance towards the achievement of expected targets at output, outcome and objective levels. The TA should support the PIU and related participating technical divisions and agencies of MOFMRA by following a clear roadmap of management knowledge and skill building and transfer along the programme implementation.

114. The technical team established under the TA will be recruited through external and open process. It will be composed of at least one (1) Chief Technical Adviser who reports to the PIU Director and leads the technical team, and other expertise key to the programme management and operations, such as in financial management, procurement, M&E and KM, and other specials fields relevant to the three technical components.

115. **Focal points.** Related ministries and institutions such as MOF, MED, MONPI, MOE, SDFC will appoint respective focal point to liaise and work with the PIU and its technical team. Similarly for participating technical agencies and institutions under MOFMRA and other partner agencies or organizations, such as the Agricultural Extension Centers (AEC) and the Agriculture Research Center (ARC), Ministry of Gender Family and Social Services (MGFSS).

116. MACO will establish its Implementation Coordination Unit (ICU) to implement the tasked activities under the technical components, under the guidance and supervision of the PIU Director.

117. Each island under the hub will form an island cluster/forum making which will be the focal point for decisions on crops to be produced, staggering and appointing extension link farmer. The island forum leads and Extension Link Farmers who lead the farmers' forums will be trained by the programme to act as key facilitators.

118. **MoUs on implementation partnership.** Implementation agencies and partners such as MACO, SDFC, MFLC and possibly MGFSS will enter into partnership agreement by signing a Memorandum of Understanding (MoU) with MOFMRA that stipulates respective roles and responsibilities among others. Similarly, MoUs will be signed between PIU and public and private companies and commercial islands to highlight respective roles and responsibilities, agreed duties and operational modalities.

D. Supervision and implementation support

119. **Supervision.** IFAD will administer the loan and grant, and supervise the programme. IFAD's annual direct supervision will mainly relate to the programme financial management, its physical and financial progress, implementation management's efficiency and implementing agencies' performance at all levels. Supervision missions will primarily address issues such as: (i) Programme fiduciary aspects, (ii) Implementation progress, (iii) Outputs and outcomes under related components, (iv) Sustainability, (v) Risks and opportunities, (vi) Innovations and knowledge management, and (vii) Poverty focus, targeting and gender mainstreaming.

120. **A Mid-term review** will be conducted by IFAD. This is tentatively scheduled for 2023 at the end of the third full year of implementation. A key function of the MTR will be to review the likelihood of achieving the development objectives, outreach to target groups and target segments' capture issues, and to adjust programme focus, budget and design if considered necessary.

121. **Implementation support** will be provided by IFAD as follow-ups of its direct supervision and progress review, and as response to possible supports required by the programme management. Support will be conducted on a demand-driven basis and in accordance with needs identified.

122. Programme completion review (PCR). At the end of the programme implementation cycle, a programme completion review (PCR) will be undertaken first by the PIU as a self-assessment of the programme performance. On the basis of that, IFAD will conduct a PCR mission in close coordination with the government in order to report on the results achieved through programme interventions. The main purposes of the completion review process are to promote accountability, reflect on performance and elicit lessons learned to inform new programme design, to identify opportunities and scaling-up best practices, and to define an appropriate post-programme strategy. The learning dimension of the completion process should be regarded by both IFAD and the government as the foundation for improvements in future programme design and programming.

123. Planning, M&E, learning, KM and communication, and financial management are integrated part of the programme management. They will be elaborated in separately in subsequent chapters.

VII. Planning, M&E, Learning, KM and Communication

A. M&E and MIS

124. **Setting up the programme M&E system.** MAP's basic M&E framework will be designed on the basis of a logframe approach, which is driven by the programme logical framework with a set of key indicators. The logframe needs to be closely linked to the project cost tables and exercises of the key functions such as AWPB preparation, progress reporting, surveys and studies should be undertaken accordingly, and supported by allocated financial resources and well-trained human resources.

125. At the programme start, the M&E system should be set up before the field operations' roll-out. The system set-up should be led by the Planning and M&E Officer/Specialist of PIU, who reports directly to the Programme Director. In view of the yet-to-be built M&E capacities, short-term consultant should be recruited to support the system set-up. ToRs are proposed as appendix X for the recruitment of consultant in this regard.

126. *Monitoring* is the routine tracking of the key elements of programme performance, usually inputs and outputs, through record-keeping, regular reporting and surveillance systems as well as facility observation and client surveys. Monitoring helps programme managers determine which areas require greater effort and flag questions that might contribute to an improved response. In a well-designed monitoring and evaluation system, monitoring contributes greatly towards evaluation.

127. *Evaluation* in contrast is the episodic assessment of the change in targeted results that can be attributed to the project intervention. In other words, evaluation attempts to link a particular output or outcome directly to a particular intervention after a period of time of implementation of a particular project has passed. Evaluation helps project managers determine the value or worth of a specific project.

128. **Integrated M&E and KM system.** The integrated Monitoring and Evaluation (M&E) and Knowledge Management (KM) system will be developed in accordance with IFAD guidelines and government frameworks. It will have with three main objectives as following:

- (i) monitoring results: it will enable the tracking programme outputs and outcomes, within farmer groups and communities, between genders, age groups and different social groups.
- (ii) implementation guiding and policy dialogue: the information and analysis of data will support timely results-based management at all levels to develop profitable and sustainable activities and to adapt strategies accordingly. It will also support policy decision making of MOFMRA to better respond to the challenges of agricultural commercialisation in the country.
- (iii) knowledge sharing and scaling up of good practices: the integrated M&E and KM system will capture lessons, shortcomings for risk management, good practices, successful innovations and technologies options or scaling up.

129. *Strategic principles.* The integrated M&E and KM system's features will be: (i) open and easily accessible, i.e. information and knowledge should be available to all stakeholders and not restricted to programme or MOFMRA staff; (ii) participatory and accountable: the process of planning, monitoring and knowledge dissemination will involve associate programme stakeholders and beneficiaries with two-way communication i.e. upward (to and from government and IFAD) but also downward (to and from programme stakeholders and target groups) and horizontal (with other programmes); (iii) focused on analysis, learning and sharing in support of decision-making and policy dialogue, and not merely on data production and consolidation; (iv) harmonised with and connected the government's relevant information systems such as the coming Agricultural Information and Communication Technology system; (v) inclusive to allow women, poor and marginalised groups participate in the system; (vi) strengthening: building capacity and better respond to the people needs and market demand.

130. **ORMS** is a fully-fledged online system that builds on interconnected templates for online presentation, analysis, reporting, and approval of project design, supervision and completion

documents. The ORMS will bring IFAD (under the Development Effectiveness Framework) more in line with the standards of other MDGs while gaining efficiencies throughout. Such efficiency gains include streamlined harmonized processes, improved data generation capturing and accessibility, better statistics and reports, and thus enable more timely and evidence-based decision making through better quality, accessible and real-time results analysis and report.

131. **Management Information System (MIS).** MAP will establish an MIS system in the first year of programme implementation. The MIS would generate, monthly, quarterly and annual progress reports on physical and financial progress and on programme outputs and outcomes - and may have a GIS interface so that key data can be shown on maps.

B. Planning

132. MAP will apply a results-based management approach which establishes a solid linkage between planning (including resource allocation), implementation, monitoring and expected results. The Programme Annual Work Plan and Budget (AWPB) will be a basis for implementation and should clearly describe the strategic direction of the programme for the coming years by presenting a budget estimate, the expected results under each component and how these results would be achieved with risk analysis if any. The preparation of AWPBs will be jointly conducted by the programme management in consultation with participating agencies and organizations, all implementing partners, private sector, local service provider and beneficiaries (farmers and women) where relevant. A participatory annual planning process with stakeholders will be set up to ensure the bottom-up feedback on community needs, priorities, contextual opportunities and limitation. The consolidated AWPB will be submitted to IFAD in advance of the Government's annual budgeting process to ensure sufficient counterpart funding

133. **The Annual Work Plan and Budget (AWPB)** is an important management tool and its process should be completed through participatory exercise from the village level to avoid top-down planning. AWPB is also a core document that is closely related to further progress reporting and M&E exercises.

134. *Preparing the AWPB.* An AWPB primary consists of seven parties (chapters), which first update the past achievements with focus on the previous year's (except the first-year AWPB), then address the projections for the upcoming fiscal year:

- a) Update on past achievements:
- b) Narrative introduction
- c) Summary of physical and financial Achievements (N/A for PY1 AWPB)
- d) Projections for the upcoming fiscal year:
- e) Summarized presentation by components
- f) Detailed presentation by components
- g) Cost and financing

135. In preparing the first AWPB, the Programme Management should be aware of available budget and the amount of Initial Advance released in order to prioritize critical investments identified. It would be necessary to prepare the following programme year's budget to avoid shortage of funds available for the succeeding year. Programme Management at different levels should assume the timely undertaking of AWPB and submit it to IFAD for No-Objection.

136. Counterpart matching funds and other partners' contributions should be secured and accounted in the AWPB.

137. In preparing the AWPB, narrative presentation should be concise and precise; spreadsheet tables and schemas should be used where needed to illustrate targets, achievements, costs and financing.

138. Progress prior to programme start may be described for PY1 AWPB. This may include: Compliance with the effectiveness of Financing Agreement, establishment of management and operational structure, procurement, staffing, project areas' preparation, beneficiary selection and targeting, identification of support and training needs, commitments of local stakeholders and levels of counterpart matching funds.

139. Summary Presentation by Components. This chapter should present the implementation programming both in physical and financial targets, expected outputs and outcomes that lead to future impacts. Indicate if there are any major changes compared to last year's programme and budget, referring to the previous chapter if appropriate.

140. Detailed Presentation by Components. In this Chapter, a detailed discussion of the programming and implementation strategy of each component is presented as well as a discussion of the expected results and how the implementation modalities eventually differ from the previous year(s)' practices. For each component, present the following:

- a) *Objectives and targets.* Indicate the component objectives and physical targets for the AWPB period and compare with the whole project duration, discuss any trends;
- b) *Implementation strategy.* Indicate how the activities of the component will be programmed and implemented, discuss participatory approaches and discuss any institutional problems and their required solutions;
- c) *Results.* Indicate the expected results in terms of quantitative indicators and in terms of qualitative aspects. Indicate the expected number of beneficiaries (women, men) and households. Compare with the overall target of the project and with last year's results;
- d) *Changes.* Discuss and justify any changes compared to the initial design and previous experiences, in targets, implementation strategy or expected results. Indicate reasons.

141. Cost and Financing. This Chapter discusses issues related to the AWPBs costs and financing. Overall summary cost tables by component and by expenditure category should be prepared to help outline the sums of AWPB, followed by detailed cost tables by component/sub-component, which should be closely linked to the project detailed cost tables (DTs). All tables should indicate the financial resources by financier as related to component activities, and to the summary table by expenditure category.

142. Costs: Any major changes in unit costs due to inflation/deflation and to changes in design compared to previous years and to the Appraisal report should be discussed and the manner who to deal with them indicated. (Unit costs may have changed since the appraisal report)

143. Financing: Issues related to the flow of funds, the timeliness of funds availability, of approval and disbursement procedures for all financiers will be highlighted, and ways to improve or overcome constraints indicated. (Not likely to be relevant in the project's first year).

C. M&E exercises

144. Data recording and reporting. Data recording, reporting and consolidation will follow the operational structure of implementation in organizational accountability. A set of standardized tables for data recording and reporting are proposed as appendixes, to be used from the field action level by the contracted implementing agencies in charge of the activity or intervention execution, or the facilitating agencies involved. The data forms will be revised and updated at the programme start-up in line with the possibly revised logframe, and the AWPB spreadsheet forms.

145. The PIU is responsible for monthly record and report on implementation progress by filling up and compiling the forms of:

- Component-wise output-level indicators, which will feed the logframe output-level reporting;
- AWPB progress report; and
- Beneficiary participation and state of benefits.

146. Similarly, implementing partners, service providers contracted for implementation will observe the M&E and reporting duties, reporting on physical and financial progress, beneficiary participation and state of benefits as agreed as in the MoU or contract agreement with the PIU, and by applying the same record and report formats with some possibly minor modifications.

147. **Data consolidation.** Data collected and consolidated by PIU M&E Officer/Specialist. The results of review, analysis and recommendations will be periodically (monthly or at least quarterly) submitted to the piu to assist its operational decision making.

148. The PIU will provide guidance on priority follow-ups to involved implementing partners or service providers. The PIU will integrate the M&E results in its periodic reports to PSC and IFAD.

149. **Progress reports.** Semi-annual and annual progress reports should be made and submitted to IFAD (As required by Section 8.03 (Progress Report) of the General Conditions) during the programme implementation period.

150. In addition, quarterly result report preparation focusing on outputs and quarterly review exercises will be maintained by the PIU in order to periodically keep in track the progress, and raise questions where indicators may show irregularities therefore necessary operational adjustments would be undertaken to assist the safeguard of implementation performance.

151. The progress report should present the main achievements, issues and constraints of the previous period, including the main recommendations of supervision, progress review, MTR, spontaneous support missions and the state of related follow-ups, as well as an appreciation of possible indications of outcomes and impact of the programme on the poverty and gender situation.

152. **Evaluation.** MAP may have four types of evaluations.

153. *The Baseline Survey*, which is a semi-formative evaluation to be conducted in the design phase or immediately after the start-up to identify and resolve intervention and evaluation issues before the programme is widely implemented, and form the basis for assessing impact achievement in the future. In another word, this exercise will lay down the start points for the interventions designed to achieve the realistic goals.

154. The baseline survey is primarily designed to assess the physical and socio-economic status of the programme area and its inhabitants in order to define their ‘baseline’ status before the implementation of programme activities so as to allow for the impact of the programme to be measured at a later stage by comparison to the baseline. This survey will cover a selection of clusters and islands in the programme area. The indicators to be monitored will be selected from the MAP programme Logframe in line with the latest revised IFAD ORMS. The ToRs that include the survey methodology, sample size, timelines for field survey, analysis and reporting, qualifications of outsourced service provider should be submitted to IFAD for its no-objection.

155. *The mid-term review (MTR) survey* is a typical outcome evaluation, which is designed specifically with the intention of being able to attribute the changes to the intervention itself. At the very least, the evaluation design has to be able to plausibly link observed outcomes to a well-defined programme, and to demonstrate that changes are not the result of non-project factors. Thematic and sector surveys and studies can be undertaken in relationship with the project scope of intervention.

156. The programme MTR would be conducted no later than 30 months (2.5 years) after its entry into force, to assess the progress, achievements, constraints and emerging impact and likely sustainability of programme activities and make recommendations and necessary adjustments for the remaining programme period. The MTR would be carried out jointly by the government and IFAD, and will also assess the role of the implementing agencies and involved parties, and the role of the private sector and government, partnering financial institutions, etc. The MTR survey will follow the overall framework of the baseline survey, but measuring possible behavior and fundamental changes since the programme start.

157. *The end-line/completion review* will be a logical step at or after the programme completion, if the MTR evaluation shows a change in outcomes. True end-line evaluation, able to attribute long-term changes to a specific project, is very rare. Rather, monitoring impact indicators taken in conjunction with process and outcome evaluations are considered to be sufficient to indicate the overall impact.

158. At the end of the project, the PIU will draw up a Project Completion Report (PCR) based on IFAD's guidelines¹ for project completion. IFAD will provide support to the programme in this work. IFAD will carry out a PCR Validation on the basis of the programme PCR at least 3 months before the loan closing. IFAD's Independent Office of Evaluation (IOE) may also undertake a formal Evaluation of the programme well after its closure (which is usually known as Project Performance Assessment or PPA).

159. *Special thematic/diagnostic studies.* The programme may carry out, or commission, a number of relevant thematic special studies. The programme will allocate budget in its AWPB and some of the thematic studies could include, for example, policy engagement, climate resilience, behaviour changes in agriculture, etc. All the studies must be carried out through gender lens where applicable.

160. **Gender focus in M&E.** Integrating gender dimension in M&E and reporting on gender through sex-disaggregated data is imperative in all IFAD projects. Integrating gender into M&E system helps to measure the extent to which a project has addressed the different needs of women and men, and has made an impact on their lives and overall social and economic well-being. It also facilitates to improve project performance during implementation, allows for mid-term course correction, and makes it possible to derive lessons for future projects. Because of the project's commitment to gender transformation, it will undertake simplified Pro-WEAI survey at baseline and completion. An indicative budget of USD 50,000 (from the allocated M&E budget), will be directed to the Pro-WEAI survey. However, the figure may change during implementation based on procurement outcomes.

D. Learning, knowledge management and communication

161. **Learning.** MAP represents a good linkage between strengthened institutional technical support system, enhanced production, marketing and commercialization together with nutrition aspect and climate-smart sensitivity. The dedicated M&E concerned staff will also be responsible for knowledge management and learning. The programme learning would comprise of various activities relating to M&E and KM functions. Some of these would include monthly, quarterly and annual review meetings; capturing information on progress, lessons and finding solutions for implementation constraints. KM and lessons learning would be used as a tool for internal learning by programme stakeholders such as staff of various implementing agencies, participating communities and farmers, both women and men.

162. **Knowledge Management and Communication (KMC)** strategy and plan will be developed in line with IFAD policy on KM and to ensure that knowledge, technologies and innovations generated within the programme is systematically identified, analysed, documented and shared, and that it is used to: (i) improve programme performance and delivery of programme objectives; (ii) be flexible and responsive to changing circumstances; (iii) support the dissemination of innovation to the benefit of stakeholders throughout the programme area and beyond; (iv) provide information to support decisions on up-scaling to be made at mid-term review; and (iv) identify important issues to convey to policy makers. Particular attention will be given to documenting good practices, successful technologies and innovation models for sustainably competitive agriculture. Knowledge products may include studies, events, videos and blogs. They will be distributed through multiple channels such as social media, local media and platforms.

163. **Potential for innovations and scaling up.** In the context of Maldives MAP will undertake the following innovative interventions which are commercially interlinked: (i) introduction of self-ventilated greenhouses for the hot humid tropics; (ii) moving gutter with hydroponic irrigation, increasing production area minimising water use; (iii) closed vertical hydroponic production systems minimising water use and space for production; (iv) rainwater harvesting and storage reducing pressure on groundwater; (v) introduction of a commercial sustainable extension system in conjunction with input supply, with a good chance to become sustainable; (vi) introduction of marketing arrangement and unbroken transport cold chain; (vii) introduction of selection of appropriate coconut varieties, and propagation of the most climate resilient varieties; (viii) commercialisation of wild fruit and nuts and

¹ <https://www.ifad.org/documents/10180/4675ae7d-0b76-4d01-87fa-090b86920eba>

propagation of planting material; (ix) introduction of a holistic coconut based agroforestry cropping system including most promising wild fruits, nuts for processing and legumes for compost making and commercial sale substituting import of manure from India and Sri Lanka; (x) introduction of MGAP and Codex Alimentarius on a large scale; and (xi) support MACO to provide agriculture extension in conjunction with high quality agriculture inputs, equipment and machinery.

164. If the commercial interlinkage of the MAP interventions is successful, its scaling up will happen with limited external inputs and with little pressure on the public merger resources. It is however not possible for proposed project interventions to safeguard against rising sea level, which is the biggest threat to the Maldives.

VIII. Financial management, procurement and governance

A. Overview

166. **Brief introduction:** This section lays down the basic principles of financial management of the project. It lays down the system of funds flow to the project and within the project, the disbursement systems, submission of withdrawal application for reimbursement of funds, the system of recording transactions, reporting the same and the audit requirements.

167. **Lending terms:** MAP will be financed by a highly concessional loan of USD 3.3 million and a DSF Grant of USD 1.2 million from IFAD. The terms related to the loan assistance will be as per the Guidelines for IFAD Lending Terms and Financing Conditions and be specified in the Letter to Borrower.

168. **Retroactive Financing:** At the Borrower's request IFAD financing can be provided as retroactive financing as an exception to the General Conditions and with Executive Board approval, to cover eligible expenditures between the date of approval of the design document by IFAD and the date of Entry into Force. Some of the activities that can be funded under retroactive financing will be: (i) costs related to Company (MACO) formation (ii) staff recruitment cost including advertisement cost and salary cost of the key staff; (iii) some operating costs; (iv) costs for studies to be initiated (v) purchase of a minimum set of equipment and materials like computers with related software, minimum furniture, accounting software; and (vi) activities related to the baseline survey. To be eligible for retroactive financing, goods and services must have been procured according to the procurement procedures applicable to loan financing. It is expected that the costs for these activities will not exceed USD 450,000 and will be charged to the respective loan categories. The funds for these activities will be provided initially by the GoM which will be reimbursed once the IFAD conditions precedent to first withdrawal have been met.

169. **Start-up Financing:** IFAD encourages the use of pre-approved start-up advance for specific activities that enable project fast-start between the date of signature of the Financing Agreement (Entry into Force) and the conditions precedent to the first withdrawal having been met.

170. Fund Flow mechanism:

- (I) **To the Project:** The Project will be funded from the following sources: IFAD Loan, IFAD Grant, GoM contribution to the PIU, by way of operational costs and salaries, GoM contribution by way of taxes and MACO for some operational expenses. Contribution from SDFC will be by way of financing project beneficiaries. Funds from IFAD loan will flow to a Special/Designated Account maintained in USD in a bank acceptable to IFAD and operated by the Ministry of Finance (MoF), Government of Maldives (GoM). MoF will have two designated accounts – one for loan and the other for grant funds in the Maldives Monetary Authority (MMA). The MMA will release these funds on the request made by the PIU in respect of project expenditure duly authorized by the MoFMRA and the MoF for implementing project activities directly to vendors, service providers, beneficiaries.
 - a) **IFAD Funds:** Proceeds of IFAD loan funds will be disbursed using one of the following four methods: (i) advance withdrawals or replenishments to the bank account(s) designated to receive loan resources; (ii) direct payment; (iii) Special Commitment (under letter of credit); and (iv) reimbursement. IFAD will make an initial advance of USD 330,000 which is about six months of IFAD allocation towards the project into the Designated Loan Account and USD 120,000 million into the Designated Grant Account and then replenish the Designated Accounts on the basis of Withdrawal Applications submitted by the PIU through the GoM.
 - b) **Counterpart Funding**
 - (i) **Government of Maldives:** The PIU of the project will be responsible for preparing the Annual Work Plan & Budget (AWPB) for the Project by consolidating the AWPBs of all implementing partners and community level activities. For availing GoM funding also payment request will be made by the PIU to MoFMRA which in turn will submit it to the MoF. On approval by the MoF, the MMA will release the funds to the payee as requested. Taxes on project implementation will be borne by the GoM.

- (ii) **Maldives Agriculture Corporation (MACO):** The proposed company MACO will be one of the implementing partners for the project. It will incur some operational expenses for project implementation. Support will be provided to MACO for procuring inputs which will be supplied by them to the project beneficiaries.
 - (iii) **SME Finance Development Company (SDFC):** SDFC is a non banking finance company which provides finance to small and medium enterprises including agriculture loans. It is envisaged that in cases where SME Development Finance Company (SDFC) finances the project beneficiaries, the project will fund the gap between the SDFC finance, the beneficiary contribution and the cost of the activity undertaken.
- (II) Within the Project:** Since all funds will be disbursed directly by the MMA for implementing project activities based on approved payment request from the PIU, the PIU as such will not have any other project bank account.

171. Accounts by type: designated accounts and project account: Two Designated Accounts in USD, one for Loan and the other for Grant, will be opened by the GoM at the Central Bank viz. The Maldives Monetary Authority (MMA) to which funds will flow from IFAD. The advance funding from IFAD to the Designated Accounts will be equivalent to six months of projected annual budget. PIU will submit WAs for the IFAD financed eligible expenditures as per the procedures and formats agreed with IFAD through the MoF, GoM.

172. The PIU will not have any separate bank account as all disbursements for project expenditure will be made by the MMA directly to the vendors, service providers and other payees. The counterpart funds, other than salaries to the GoM staff, (which will be paid directly by the Govt) will also be paid directly from the MMA. GoM and MACO will provide the details of expenditure incurred by it directly (salaries and allowances) towards the project, to enable consolidation and reporting of total expenditure of the project.

B. Disbursement procedures, withdrawals and withdrawal applications

173. There are four standard procedures that are used for disbursing Loan funds from IFAD. The Loan Disbursement Handbook for IFAD Directly Supervised Projects provides details of disbursement methods and submission of Withdrawal Applications.

174. **Procedure I: Designated Account (DA) and initial advance.** IFAD financing to the Project will be routed through a Designated Account denominated in United States Dollars maintained at the Maldives Monetary Authority (MMA) under the Ministry of Finance (MoF) which will administer the Designated Account. IFAD will establish an Authorized Allocation for initial advance, initially up to USD 330,000 for Loan and USD 120,000 for Grant. This will be indicated in the Letter to the Borrower/ Recipient. However, the quantum is subject to the agreement between IFAD and GoM at Loan Negotiations, as this will count for the payment of interest and service charge.

175. This procedure provides a mechanism like a revolving fund to assist the government in financing eligible expenditures defined in the Financing Agreement as payment falls due. While the project implementation is underway the account is replenished when satisfactory evidence of expenditure incurred is received. Deposits to replenish the Special/ Designated Account are claimed under this procedure using Application for Withdrawal – Form 100.

176. Summary sheet (SS) Form 101 is used when additional space is required, that is, more than one contractor, or if expenditures relate to multiple suppliers on a reimbursement basis. Summary sheet Form 101 is used to summarise several invoices or receipts claimed for replenishment. Separate summary sheets are used for each disbursement category.

177. SS Form 102 is used when expenditures are claimed under Statement of Expenditures (SOEs). If expenditures are claimed under an SOE, supporting documents are not required to be submitted with

the withdrawal applications. SS Form 102 is attached to the withdrawal application, supported by Summary Sheet(s) in Form 101 in which the corresponding itemised expenditures and related information is provided. Also if supporting documents are not required, the project shall itemize every single claim by indicating relevant data (good/services provided, date, amount disbursed, bill number, etc.).

178. If the expenditures are not claimed under a SOE, the supporting documents (bills, invoices, receipts, evidence of payment and evidence of shipment) are submitted and attached to the withdrawal application.

179. **Procedure II: Reimbursement.** All eligible expenditures pre-financed by the government are claimed for reimbursement under this procedure using Application for Withdrawal –Form 100 and Summary sheets Forms 101 & 102 as with Procedure I above. This type of disbursement will be very common with the project. This procedure is followed when expenditures have already been incurred, that is, the suppliers of goods or services have already been paid by the Government from its own funds. The reimbursement procedure is generally suitable for payment of (i) local currency costs, (ii) petty purchases; and (iii) small civil works payments. The reimbursement procedure normally requires full documentation. However, where it is impractical or unduly burdensome to submit full documentation in support of application for withdrawal of loan/ grant proceeds IFAD accepts simplified documentation by way of Statement of Expenditures (SOE).

180. *Withdrawals from the Loan/ Grant Account* may be made against SOEs in respect of Eligible Expenditures in such amounts/ or at such intervals as IFAD may designate from time to time by notice to the GoM. The records evidencing such expenditures need not be submitted to IFAD but will be retained by the GoM and made available for inspection by the representatives of IFAD. The PIU will retain the relevant documents and make them readily available for inspection and review by supervision missions and the auditors. No taxes and duties will be financed out of the proceeds of the IFAD loan. The PIU will compile and consolidate, on a timely basis, eligible Project expenditures for all project activities and consolidate and process, on a timely basis, withdrawal applications for all eligible Project expenditures and submit such withdrawal applications to IFAD through MoFT for reimbursement or replenishment of the Special/Designated Account.

181. PIU shall submit withdrawal applications every quarter based on the actual eligible expenditures incurred at PIU and by the implementing partners. Expenditure categories eligible for financing under the Financing Agreement and as per the disbursement percentage will be financed out of the proceeds of the IFAD loan/Grant.

182. **Procedure III: Direct Payment.** Under this procedure, the government requests the Fund to pay suppliers directly from the loan/grant funds. The procedure is similar to Procedure I described above but the payment is made direct to the third party as advised and instructed by the Government.

183. **Procedure IV: Direct Payment to a foreign supplier.** Under this procedure, the government uses a Letter of Credit (L/C) as a mode of payment to a foreign supplier. Form 301, an Application for a Special Commitment, Form 302 Letter of Commitment from IFAD to a Bank and Form 303 Bank's Request for Payment. This is extensively used for financing import of goods and under this procedure IFAD gives assurance to the suppliers.

184. No withdrawal can be made in respect of expenditures until:

- (i) the PIU for implementation of the project is established and finance staff recruited;
- (ii) the GoM shall have duly opened the Special/Designated Account
- (iii) the MoF has added MAP into their accounting/financing system
- (iv) the first AWPB, including the procurement plan for the initial 18 months of Project implementation, shall have been submitted to, and approved by IFAD.

185. The disbursement procedures are summarized below:

Disbursement Procedure	Disbursement Type	Description
Procedure I	Special/ Designated Account	This is for advance funding from IFAD for start up activities and is used for claiming further deposits to replenish the Special/ Designated Account
Procedure II	Reimbursement	This procedure is used for claiming reimbursement where eligible project expenditure reimbursable by IFAD have been pre-financed by the Government
Procedure III	Direct Payment	IFAD makes direct payment to a third party on the basis of Government instructions
Procedure IV	Special Commitment	This is used for items imported by the Project under a Letter of Credit requiring guarantees for reimbursement

186. The formats of the above mentioned forms will be provided at the time of start-up of the project.

187. **Checklist for compiling a withdrawal application:** Following aspects need to be checked and verified before an Application for withdrawal is sent to IFAD for reimbursement or payment. The supporting documents mentioned below are needed only if the expenditure exceeds the threshold of USD 20,000 for a single payment:

- Designation of WA signatory
- Designation for operation of the special/designated account
- WA Sequential number and coverage period
- WA signatory
- Currency and the amount due
- Account number
- Banking instructions
- Correspondent bank
- Supporting documents
- Percentage of Financing
- Disbursement procedure used
- Procurement details
- Contract or purchase order no and date
- Description of goods, works or services
- Currency and total amount of contract
- Invoice numbers and net amount of invoice covered by this application
- Withdrawal details: category and % of expenditures to be financed by IFAD

C. Auditing

188. **Audit procedures and arrangements** for conducting effective audit for each year and arrangement for internal audit and its procedures: The accounts of the Project for each Fiscal Year shall be audited by independent auditors acceptable to IFAD. The audit shall be in accordance with Article 9 of the IFAD's General conditions and the IFAD Handbook of Financial Reporting and Auditing of IFAD-financed Projects,

(<https://www.ifad.org/documents/38711624/39421009/IFAD+Handbook+for+Financial+Reporting+and+Auditing+of+IFAD-Financed+Projects/133b165d-15c7-4f79-8217-aef95b79dd67>) . The ToR for the auditors is also provided in the aforesaid Handbook. The GoM will engage the services of the Office of the Auditor General (OAG), Republic of Maldives to conduct the annual audit of the project.

189. The auditors shall adopt the Standards of Auditing acceptable to IFAD and the Government while auditing and reporting on the Project Accounts. The accounting and auditing standards adopted should

be disclosed in the notes to the accounts. The audit report shall contain a clear expression of the auditor's opinion regarding the financial statements. The auditor is required to deliver an audit package that includes: (i) the audited financial statements including additional disclosures as required by IFAD Handbook (ii) an audit opinion on the financial statements (iii) a report on factual findings and any ineligible expenditure identified should be reported (iv) a Management Letter. Through the management letter, the auditor will identify deficiencies in the project accounting records, procedures, systems and internal controls and make appropriate recommendations for improvement. It will also include any significant matters that come to the auditor's attention and might have a material impact on project implementation. The audit of the Designated Account will also be done by the OAG.

190. In reviewing the project accounts and financial statements, the auditor will adhere to the scope of audit provided in the IFAD Handbook (Appendix 7). The auditor also will:

- verify that acceptable accounting standards have been consistently applied and indicate any material deviation from these standards, and the effect of such deviation on the annual financial statements;
- assess the adequacy of accounting and internal control systems (procedures and responsibilities) for monitoring expenditures and other financial transactions (commitment, review, approval, payment and accounting) and ensuring safe custody of project-financed assets, and document any instances where controls are lacking or need strengthening;
- determine whether the PIU/IPs have maintained adequate documentation for all transactions; e.g. procurement documents, contracts, suppliers, invoices, letters of credit and evidence of payment, and ascertain that expenditures were properly authorized and in compliance with legal requirements;
- verify the numerical accuracy of statements and accounts;
- verify that disbursement requests for expenditures submitted to IFAD are eligible for financing under the loan agreement, and identify clearly any ineligible expenditures; and
- carry out a physical verification of any significant assets purchased and confirm their existence and use for project purposes.
- report on the status of implementation of recommendations issued in the previous years

191. The auditor shall discuss the findings in the form of a draft report with the project's finance and accounts department and the Project Director. The auditor shall consider and include the response of the project in the final report.

192. The audited statement of accounts along with the audit report and the Management Letter shall be furnished by the project to IFAD within six months of the end of each Fiscal Year. The auditor shall discuss the draft management letter with the PIU and include the Project's replies/comments in the final version of the management letter. In any case, the project shall submit to the auditors and IFAD the reply to the management letter of the auditors within one month of receipt thereof.

193. The PIU shall maintain an Log of Audit Observations made by the auditors and also a Table of Summary Status of Audit Observations and get it validated by the auditor during the subsequent audit or earlier.

194. **Internal Audit:** MOFMRA does not have a system of internal audit. It is proposed that a firm of Chartered Accountants will be engaged as Internal Auditor (IA) of the project who will be responsible for the internal audit of the PIU and implementing partners, such as MACO, on a quarterly basis. A copy of the report along with the Management replies to the observations will also be submitted to IFAD. The

internal auditors will, besides the financial audit, will review the systems of internal control and suggest improvements, if required, thereto. The internal audit should also include statutory compliances. The TOR will include the key aspects of financial management and procurement. The internal auditors will submit quarterly reports to the Project Director. Corrective follow up action shall be taken by the PIU/MACO. The action taken report shall be submitted to the PD and the internal auditors. The internal auditors will evaluate action on previous internal audit reports, and effectiveness thereof and report on the compliance thereof in the subsequent report. The Project Director will place the reports and its action taken reports before the PSC every six months. The quality of internal audit reports submitted by the internal auditors in the first year of implementation will be reviewed by the Review Mission of IFAD and if these reports are found to lack quality, PIU may be requested to make alternate arrangements, acceptable to IFAD, for conducting the internal audit in later years. The ToR of the Internal Auditor will be submitted to IFAD for prior review.

195. **Ineligible Expenses.** If the auditors during the course of their review find ineligible expenses, these will be reported as an exception regardless of their materiality. If the ineligible expenditures are immaterial and if the project agrees on the auditor's review, IFAD recommends immediate correction, in order to avoid unnecessary qualifications. If the WA are found to include ineligible expenditures, the borrower will be required to refund the amounts in question.

D. Accounting systems, policies, procedures and financial reporting

196. The project will follow a double entry and computerized accounting system at all levels. The accounting will be in accordance with the generally accepted Standards of Accounting and accounting practices adequate to reflect the operations, resources and expenditures related to the project until the Financing Closing Date, and shall retain such accounts and records for at least ten (10) years thereafter.

197. MOFMRA currently uses SAP software for its accounting. The project will have a uniform chart of accounts across all its implementing offices and consolidation of accounts will be done at the PIU every month through the use of the software. The reports will be useful for preparation of the quarterly withdrawal applications. The PIU shall be also responsible for the preparation of the annual financial statements of the project which will be subject to external audit. The AWPB, six-monthly reports prepared by the project and the audited accounts shall be submitted to the PSC for approval and then forwarded to IFAD. The PFS shall include financial statements covering the reporting period in accordance with IPSAS – Financial Reporting under the Cash Basis of Accounting. In addition, the following specific disclosures will be included in the financial statements

- Withdrawal application statement – appendix 1 to the IFAD Handbook on Financial Reporting and Auditing of IFAD-financed Projects
- Sources and uses of funds statement- appendix 2 to the IFAD Handbook
- Statement of Expenditure – appendix 5 to the IFAD Handbook (applicable to grants)

198. **Taxes:** Section 11.01 of the General Conditions stipulates that the Loan and all Loan Service Payments shall be exempt from all Taxes, and all loan service payments shall be made free and clear of taxes. It is the policy of the Fund that Loan proceeds are not to be used to pay Taxes, including (but not limited to) any taxes levied on the imports, procurement or supply of any good, civil work or services financed by the Loan but excluding taxes on the overall income. If taxes are to be absorbed by the Government, they will be recorded under the counterpart contributions. A separate record should be kept for taxes paid by the Project.

199. **Materiality:** Information is material if its omission or misstatement could influence the decisions or assessment of the users made on the basis of the financial statements. Materiality depends on the nature or size of the item or error judged in the particular circumstance of omission or misstatement. In the public sector, materiality includes compliance with authorities, legislative concern or public interest.

In the context of IFAD-financed operation will include compliance with the Project Financing Agreement and in particular the requirement that IFAD funds may only be used for the purpose stated therein.

200. Project completion report with reference to financial management: The Project will be completed and loan/grant closed as specified in the Finance Agreement.

- Withdrawal Applications may be continued to be submitted up to the Loan Closing date i.e. six months after the project completion date.
- Only payments made, or payments due for goods and services, which have been provided prior to the project completion date, qualify for disbursement. The only additional expenditures allowed are for winding up activities (salaries, audit fees, project completion report)
- No replenishment will be made after the project completion date.
- The Special/Designated Account recovery will begin early enough to ensure that no balance remains in the special/designated account at the closing date.
- The following three steps will be adhered to for loan closing: (i) final statement of accounts, (ii) preparation of final audit report, and (iii) preparation of Project Completion Report

201. Asset Management: Proper record of fixed assets shall be maintained at the PIU and the DMUs which shall include the date of purchase, the specification, the unique identification number, the location and the cost. In case assets are allocated to any staff member this should be mentioned in the asset register. The fixed assets shall be physically verified at least once in a year and the evidence thereof shall be recorded in the asset register. All assets procured by the project shall be adequately insured. The asset registers should be regularly reconciled with the books of accounts.

202. Financial Manual: MOFMRA has a manual for Program Management and Accounts Implementation Manual which was approved and adopted in December, 2012. The regulations contain operational processes of accounting, financial rules, maintenance of books of accounts, procurement rules, personnel management, document management, asset management, data security, delegation of financial powers etc. This is a dynamic document and can be changed under proper authority. The PIU will update this with the current rules, regulations, policies and accounting systems which will meet with the requirements of MAP and the same can be used as a Financial Manual for the project.

E. Governance and Anti-corruption measures.

203. In accordance with provisions of the IFAD Policy on Preventing Fraud and Corruption in its Activities and Operations, IFAD applies a zero-tolerance policy with regard to any fraudulent, corrupt, collusive or coercive actions in the programmes it finances. This entails not only pursuing all allegations of fraudulent practices and applying appropriate sanctions but also promoting preventive control measures such as assessments of national and programme-specific FM, auditing and procurement systems during the programme design phase.

204. Where it is determined that fraudulent, corrupt, collusive or coercive practices have occurred in programmes financed through its loans and grants, IFAD applies a range of sanctions, including disciplinary measures for concerned staff; and pursues the recovery of any losses in accordance with the provisions of the applicable IFAD rules and regulations and legal instruments.

205. The Policy on Preventing Fraud and Corruption has been integrated into IFAD's legal framework (Programme Procurement Guidelines², General Conditions for Agricultural Development Financing³, IFAD's Code of Conduct⁴) and applies to all recipients of IFAD financing.

²<https://www.ifad.org/web/quest/document-detail/asset/39438991>

³<https://www.ifad.org/web/quest/document-detail/asset/39500875>

⁴<https://www.ifad.org/web/quest/document-detail/asset/40186603>

206. In line with this, the PIU will ensure that all its activities are implemented within a transparency framework. This framework will include measures to ensure that both procurement (either carried out by PIU or any other implementing partner) and the selection of agribusinesses and farmer groups that will benefit from the programme, are carried out in accordance with IFAD rules and programme's design specifications.

207. Measures which shall form part of the framework for transparency include:

- a) Publication of sourcing, tendering and contracting processes at PIU & other implementing partners;
- b) Participation of representatives of end-users in bid assessments;
- c) Prompt communication to bidders of bid evaluation outcomes;
- d) An internal code of conduct to be signed by all Programme staff;
- e) A code of business ethics, to be included in all agreements/contracts signed with partners and beneficiaries of the programme activities. The code of conduct and the code of business ethics will be included in the Programme Implementation Manual after due discussion with implementation partners;
- f) Annual programme audits, that will include a routine assessment of companies and farmer-group grants participating in the programme;
- g) IFAD's direct supervision which inter alia will address fiduciary compliance;
- h) Involvement of Programme stakeholders (and especially farmers and their organizations) in programming, implementation and M&E of programme activities;
- i) Evaluation and impact assessment outsourced to independent institutions.

208. **Lessons learned:** The quality of FM of MEDEP was moderately satisfactory at closure. The programme had issues with internal controls, contract management and maintenance of adequate supporting documentation for its transactions. Staffing was not adequate Lack of management experience at the PIU level and an overburdened finance section remained a constraint. It is proposed to have adequate and experienced staff since the beginning of the programme. SAP, which is being used in the MOF should be used at PIU from the very beginning of the programme with intensive training to improve the accounting and financial reporting of the programme.

IX. Procurement

209. Procurement for the Programme will follow the National Procurement regulations (Chapter 10 of the Public Financial Regulations) to the extent that it does not contradict with the provisions of the IFAD Procurement Guidelines and Procurement Handbook. The Programme shall follow the IFAD Procurement Guidelines and Procurement Handbook where the National Procurement Regulation does not adequately cover any stages of the procurement process. To ensure that programme procurement is carried out as per the National Procurement Regulations and the IFAD Procurement Guidelines and Handbook, the Programme shall have a full time Procurement Officer in the PIU. The Procurement Officer's responsibilities shall be defined in line with the National Procurement Regulations and include as a minimum, preparation of procurement plans, procurement of goods works and services, procurement documentation, monitoring and supervision of all contracts. A detailed ToR for the Procurement officer shall be developed in consultation with IFAD.

210. As MAP's implementation may heavily rely on the effectiveness of procurement of goods and services, special panels of procurement may need to be set up by PIU.

211. The thresholds defined in the National Procurement Regulation shall be followed for application of the procurement methods. However, for each of these methods, the procurement shall ensure the minimum time limits as follows (which is in line with section 10.43 of the National Procurement Regulation:

Procurement Method	Minimum Time limits for submission of bids	Remarks
Open Tenders	4 weeks	Goods, Works and Services
Request for Proposals	4 weeks	Consulting Services
Restricted tendering	2 weeks	Goods, Works and Services
Quotations	1 week	
Expression of Interests	2 weeks	Individual Consultants and Consulting Firms

212. Bidding Documents shall be prepared using the Standard Bidding Documents issued by the Ministry of Finance (MoF). Where such standards are not available, the Programme will prepare customized bidding documents in line with Module H: Bidding Documents of the IFAD Procurement Handbook. The first set of Bidding Documents prepared by the Programme for each type of procurement of Goods, Works, Services and Consulting Services shall be submitted for IFAD's review and no-objection. There after these documents shall be used as sample for the rest of the procurement activities.

213. The threshold for prior and post review will be provided in the LTB. A selected sample of all other procurement activities may be post reviewed at the end of each financial year.

214. More detailed guidance on procurement will be provided by IFAD at programme start, which should be incorporated into the PIM.

X. Costs and financing

A. Programme costs

215. The main assumptions underlying the derivation of programme costs, estimated programme costs and financing plan are described in this section. The programme costs are based on November 2019 prices. Some of the key parameters are presented below:

- (i) Programme period. The proposed programme would be financed over a five-year period.
- (ii) Inflation. The estimates of the Economist Intelligent Unit for the consumer price inflation in 2020-21 is 1%. Therefore 1.0% of inflation was set as a base for the analysis for the whole programme period 2020-2025.
- (iii) Exchange rate. An official exchange rate of MVR 15.35 to USD1 prevailing in November-December 2019 has determined the Base Exchange rate for this analysis.
- (iv) Taxes and Duties. There are no taxes on agricultural goods and inputs. Any emerging in future taxes on goods and services procured under the programme will be financed by the Government.
- (v) Contingencies. Physical contingencies have only been applied on the items for which the required amounts could not be reasonably estimated and have not been applied to the funds earmarked for the matching grants and credits as they follow a demand-driven delivery scheme.

216. The total investment and incremental recurrent programme costs, including physical and price contingencies, are estimated at about USD 12.9 million (MVR 195.8 billion). Physical and price contingencies are low at 2% of the total programme costs due to the fact that investments associated with the grants, credits and TA represent around 70% of the total programme costs (expressed as a lump sum, no contingencies). The foreign exchange component is estimated at USD 9.96 million or 77% of the total programme costs. The programme management cost makes about 15% of the total programme costs. The summary programme costs are presented below.

Table 1: Programme costs by component (and sub-components) and financier

(Thousands of United States dollars)

	IFAD LOAN		IFAD Grant		MACO		Private Invest		SDFC		Govt Budget		Total	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
A. Enabling Policy, Institutions and Services														
Knowledge and Technology	736	53.6	578	42.1	-	-	-	-	-	-	58	4.2	1,372	10.6
Input Supply	1,558	86.8	-	-	121	6.8	-	-	-	-	117	6.5	1,795	13.9
Subtotal Enabling Policy, Institutions and Services	2,294	72.4	578	18.3	121	3.8	-	-	-	-	174	5.5	3,167	24.6
B. Climate Smart Production	609	9.9	245	4.0	33	0.5	-	-	5,000	81.3	261	4.2	6,148	47.7
C. Market Connection	382	23.3	100	6.1	-	-	1,140	69.7	-	-	15	0.9	1,637	12.7
D. Programme Management	-	-	293	15.1	-	-	-	-	-	-	1,646	84.9	1,938	15.0
Total PROJECT COSTS	3,285	25.5	1,215	9.4	154	1.2	1,140	8.8	5,000	38.8	2,096	16.3	12,890	100.0

Table 2: Programme costs by expenditure category and financier

(Thousands of United States dollars)

	IFAD LOAN		IFAD Grant		MACO		Private Invest		SDFC		Govt Budget		Total	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
I. Investment Costs														
A. Goods, Equipment and Materials	1,705	88.8	-	-	-	-	-	-	-	-	215	11.2	1,919	14.9
Goods, Equipment and Materials														
B. Technical Assistance and Studies	67	13.0	452	87.0	-	-	-	-	-	-	-	-	519	4.0
International TA	67	13.0	452	87.0	-	-	-	-	-	-	-	-	519	4.0
National TA	546	76.6	13	1.8	121	17.0	-	-	-	-	32	4.5	712	5.5
Studies	-	-	210	100.0	-	-	-	-	-	-	-	-	210	1.6
Subtotal Technical Assistance and Studies	613	42.5	675	46.8	121	8.4	-	-	-	-	32	2.2	1,441	11.2
C. Training and Workshops	327	75.6	16	3.7	33	7.6	-	-	-	-	57	13.1	432	3.4
D. Innovation Investments /a	640	30.1	345	16.2	-	-	1,140	53.6	-	-	-	-	2,125	16.5
E. SDFC Financing	-	-	-	-	-	-	-	-	5,000	95.0	261	5.0	5,261	40.8
Total Investment Costs	3,285	29.4	1,035	9.3	154	1.4	1,140	10.2	5,000	44.7	565	5.1	11,179	86.7
II. Recurrent Costs														
A. Salaries and Allowances	-	-	180	11.1	-	-	-	-	-	-	1,448	88.9	1,628	12.6
B. Operational Expenses	-	-	-	-	-	-	-	-	-	-	84	100.0	84	0.7
Total Recurrent Costs	-	-	180	10.5	-	-	-	-	-	-	1,531	89.5	1,711	13.3
Total PROJECT COSTS	3,285	25.5	1,215	9.4	154	1.2	1,140	8.8	5,000	38.8	2,096	16.3	12,890	100.0

Table 3: Programme costs by component and year

(Thousands of United States dollars)

	Totals Including Contingencies					
	PY1	PY2	PY3	PY4	PY5	Total
A. Enabling Policy, Institutions and Services						
Knowledge and Technology	756.5	392.0	101.6	76.9	45.3	1,372.1
Input Supply	1,297.8	135.7	139.1	109.9	112.7	1,795.3
Subtotal Enabling Policy, Institutions and Services	2,054.3	527.7	240.7	186.8	157.9	3,167.4
B. Climate Smart Production	16.7	659.3	2,056.4	1,710.0	1,705.6	6,147.9
C. Market Connection	213.0	388.1	601.8	243.8	190.0	1,636.6
D. Programme Management	414.4	359.5	386.8	365.0	412.4	1,938.1
Total PROJECT COSTS	2,698.4	1,934.6	3,285.6	2,505.6	2,465.8	12,890.0

B. Programme financing/ co-financing strategy and plan

217. An IFAD loan, USD 3.285 million (25.5% of the total programme costs), would finance: 72.4% of the Component 1. Enabling Policy, Institutions and Services (USD 2.29 million), 9.9% of Component 2. Climate Smart Production (USD 0.61 million), and 23.3% of Component 3. Market Connection (USD 0.38 million). An IFAD grant of USD 1.215 million (9.4% of the total programme costs) would finance: 18.3% of Component 1 (USD 0.58 million), 4.0% of Component 2 (USD 0.25 million), 6.1% of Component 3 (USD 0.1 million) and 15.1% of Programme Management (USD 0.29 million).

218. It is expected that additional USD 5.0 million would be attracted from the SDFC, which would finance loans for farming households, or 81.3% of Component 2. It is also expected that the private sector (mainly CAIs and MFLS) would allocate about USD 1.14 million to finance market infrastructure investments or 69.7% of Component 3.

219. Government contribution in cash of USD 2.25 million would finance 5.5% of Component 1 (USD 0.174 million), 4.2% of Component 2 (USD 0.261 million), 0.9% of Component 3 (USD 0.015 million), 84.9% of Programme Management (USD 1.65 million) as well as it would partially cover the costs of institutional capacity building of MACO amounting to USD 0.154 million. The Government will be also covering all taxes and duties if they emerge in future.

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Appendix 1: Terms of reference (ToR) for PIU key positions

Position: Programme Director (PD)

Objective: Enable small farmers in the programme area to sustainably enhance their production levels to such a degree that they provide increased income, secured food and nutrition for their household demands and deliver produce to connected markets.

Output: The Maldives Agribusiness Programme is implemented along the guidelines provided by the design report, implementation manual, lead ministry, steering committee and supervision missions

Activities

- To ensure an optimum use of Programme resources and to report to the lead Ministry and the financier(s) on the same;
- To ensure the Programme adheres social, environmental and climate-related safeguards and contributes to gender equity, women's empowerment, youth promotion and inclusive development;
- To direct Programme implementation in accordance to agreed plans and to report on progress and outcomes in a methodological manner;
- To ensure collection, processing and analysis of surveys and progress data in order to assess and strengthen the effect and impact of the Programme;
- To ensure periodic reporting on Programme implementation, including physical and financial reports;
- To ensure proper financial management, including timely application for disbursements and comprehensive reporting on expenditures and expenditure forecasts;
- To ensure a strong sense of teamwork within the PIU and to foster constructive engagement among the partners involved in Programme implementation;
- To advise the lead Ministry, the Programme partners and the PSC on adjustments in focus and direction of the Programme;
- To direct PIU staff, hired services and consultants to carry-out their agreed duties in a way aimed at achieving the Programme objectives;
- To maintain liaison with islands, their leadership and their representatives in the Programme area;
- To develop, negotiate and implement agreements with Programme partners, including participating institutions and service providers;
- To represent the Programme to all external stakeholders; and
- To undertake additional tasks agreed with PSC and IFAD.

Qualifications:

- A Master degree or more in a field related to agricultural development;
- xx-years' experience in rural development in country, of which five in a managerial position;
- Experience in Programme administration, financial management and reporting, preferably using IFAD systems;
- An existing network of relations pertaining to agribusiness, agri-extension support services, smallholder agriculture, value chains and market linkage;
- Experience in collaborating across government ministries and in public-private dialogue;
- Strong leadership skills, including the ability to delegate responsibility within the team and to implementing partners;
- Proven ability to constructively interact with teams of professionals from various stakeholders.

Position: Policy and institution specialist (Component 1 coordinator)

Objective: Together with the other component coordinators/specialists and the targeting and gender specialist the Policy and institution specialist will lead the implementation of MAP Component 1 and activities related to policy, institutional capacity building and service strengthening.

Output: The specialist will provide overall leadership for programme support to enabling policy framework, strengthened institutions and services to support the small farmers to apply climate smart, sustainable and profitable good agricultural practices.

Activities:

The specialist pursues the successful execution of under Component 1. S/he reports to the Programme Director and works closely with other partner institutions and service providers. Key tasks include:

- Liaise on a regular basis with the MOFMRA related technical departments/divisions and ARC and other implementing agencies involved in implementation of Component 1 activities for joint planning and monitoring;
- Develop detailed work plans which identify, prioritise and sequence the activities required for successful delivery of the Component 1, and contribute to the development of the Annual Work Plans and Budgets (AWPB);
- Ensure that each member of the programme field team involved in Component 1 activities has a clear understanding of their role, responsibilities and short-term activities and goals;
- Establish and regularly update a training plan for the required capacity building measures linked to implementation of the component;
- Assist in the establishment and update of the procurement plan for items linked to the implementation of Component 1.
- Ensure that component outputs are delivered in a due manner without targeting deviation;
- Assist in the design of an M&E system with regards to the activities, outputs, outcomes and impacts of Component 1 activities;
- Report to the Program Director as per agreed upon reporting schedules and formats and proactively raise issues of concern with program leadership
- Facilitate case studies and documentation of good practices as developed during implementation as part of knowledge management;
- Participate in monitoring, supervision missions, mid-term reviews and program completion missions;
- Carry out any other duties as designated by the Program Director from time to time.

Qualifications:

- A Bachelor degree in agronomy, agricultural extension, agricultural economics, or closely related field;
- A minimum of xx years' experience in the area of agriculture development;
- A minimum of x years' experience in project management and coordination;
- Sound background and experience in good agricultural practices;
- Practical knowledge and understanding of working with institutions, farmers and private sector;
- Substantial experience in capacity building of public and private institutions;
- Proven ability to constructively interact with teams of professionals from various stakeholders;
- Excellent oral & written presentation skills (**English** language);
- Creative, innovative system thinker, with ability to catalyse change.

Position: Agriculture Extension Specialist (Component 2 coordinator)

Objective: Together with the other component coordinators/specialists and the targeting and gender specialist the Policy and institution specialist will lead the implementation of MAP Component 2 and activities related to climate smart production enhancement.

Output: The specialist will provide overall leadership for programme support to training of the beneficiaries on production practices and technology adoption, organization of farmer production forums and access to agriculture financing.

Activities:

The specialist pursues the successful execution of under Component 2. S/he reports to the Programme Director and works closely with other partner institutions and service providers. Key tasks include:

- Liaise on a regular basis with the MOFMRA related technical departments/divisions and ARC and other implementing agencies such as MACO, SDFC and MFLC involved in implementation of Component 2 activities for joint planning and monitoring;
- Develop detailed work plans which identify, prioritise and sequence the activities required for successful delivery of the Component 2, and contribute to the development of the Annual Work Plans and Budgets (AWPB);
- Ensure that each member of the programme field team involved in Component 2 activities has a clear understanding of their role, responsibilities and short-term activities and goals;
- Establish and regularly update a training plan for the required capacity building measures linked to implementation of the component;
- Assist in the establishment and update of the procurement plan for items linked to the implementation of Component 2.
- Ensure that component outputs are delivered in a due manner without targeting deviation;
- Assist in the design of an M&E system with regards to the activities, outputs, outcomes and impacts of Component 2 activities;
- Report to the Program Director as per agreed upon reporting schedules and formats and proactively raise issues of concern with program leadership
- Facilitate case studies and documentation of good practices as developed during implementation as part of knowledge management;
- Participate in monitoring, supervision missions, mid-term reviews and program completion missions;
- Carry out any other duties as designated by the Program Director from time to time.

Qualifications:

- A Bachelor degree in agronomy, agricultural extension, agricultural economics, or closely related field;
- A minimum of xx years' experience in the area of agriculture development;
- A minimum of x years' experience in project management and coordination;
- Sound background and experience in good agricultural practices;
- Practical knowledge and understanding of working with institutions, farmers and private sector;
- Substantial experience in capacity building of public and private institutions;
- Proven ability to constructively interact with teams of professionals from various stakeholders;
- Excellent oral & written presentation skills (**English** language);
- Creative, innovative system thinker, with ability to catalyse change.

Position: Agribusiness development specialist (Component 3 coordinator)

Objective: Together with other component coordinators/specialists and the targeting and gender specialist the Agribusiness development specialist will lead the implementation of MAP Component 3 and activities related to market connection.

Output: The specialist will provide overall leadership for programme support to building partnerships between producers and private companies, and fostering market-driven business relationship between organized production, transportation and markets in the forms of supply contracts or contract farming..

Activities:

The specialist pursues the successful execution of under Component 3. S/he reports to the Programme Director and works closely with other partner institutions and service providers. Key tasks include:

- Liaise on a regular basis with the MOFMRA related technical departments/divisions and ARC and other implementing agencies involved in implementation of Component 3 activities for joint planning and monitoring;
- Develop detailed work plans which identify, prioritise and sequence the activities required for successful delivery of the Component 3, and contribute to the development of the Annual Work Plans and Budgets (AWPB);
- Ensure that each member of the programme field team involved in Component 3 activities has a clear understanding of their role, responsibilities and short-term activities and goals;
- Establish and regularly update a training plan for the required capacity building measures linked to implementation of the component;
- Assist in the establishment and update of the procurement plan for items linked to the implementation of Component 3.
- Ensure that component outputs are delivered in a due manner without targeting deviation;
- Assist in the design of an M&E system with regards to the activities, outputs, outcomes and impacts of Component 3 activities;
- Report to the Program Director as per agreed upon reporting schedules and formats and proactively raise issues of concern with program leadership
- Facilitate case studies and documentation of good practices as developed during implementation as part of knowledge management;
- Participate in monitoring, supervision missions, mid-term reviews and program completion missions;
- Carry out any other duties as designated by the Program Director from time to time.

Qualifications:

- A Bachelor degree in agronomy, agricultural extension, agricultural economics, or closely related field;
- A minimum of xx years' experience in the area of agriculture development;
- A minimum of x years' experience in project management and coordination;
- Sound background and experience in good agricultural practices;
- Practical knowledge and understanding of working with institutions, farmers and private sector;
- Substantial experience in capacity building of public and private institutions;
- Proven ability to constructively interact with teams of professionals from various stakeholders;
- Excellent oral & written presentation skills (**English** language);
- Creative, innovative system thinker, with ability to catalyse change.

Position: Financial management officer / Financial controller

Objective: To administer programme funds in support MAP targets and objective

Output: Transparent financial management, accounting and reporting is established, and outcomes are analysed on a recurrent basis

Activities:

Specific responsibilities include but are not limited to the following:

- Installation and utilization of automated systems with a well-coded chart of accounts to ensure that the PIU and especially the Programme Director and M&E officers are regularly informed of on-going financial activities and transactions;
- Communicate to all implementing entities and service providers their financial responsibilities, the funds available and how to access it, and the requirements of reporting and record keeping in accordance with prevailing government practices which are acceptable to IFAD;
- Maintain all accounting records in a form appropriate for regular auditing (at least once a year);
- Ensure that:
 - All MAP funds are used in accordance with the conditions of the financing agreements, with due attention to economy and efficiency, and only for the purposes for which the funds were provided;
 - Counterpart funds have been provided and used in accordance with the conditions of the financing agreements, with due attention to economy and efficiency, and only for the purposes for which they were provided;
 - Goods and services financed have been procured in accordance with the financing agreement and in accordance with government and IFAD's rules and procedures;
 - All necessary supporting documents, records and accounts are kept in respect of all Programme activities, with clear linkages between the books of account and the financial statements presented to the financiers;
 - Designated accounts are maintained in accordance with the provisions of the financing agreement and in accordance with the financier's rules and procedures;
 - The financial statements are prepared in accordance with International Public Sector Accounting Standards (IPSAS)- Cash basis with the prerequisite disclosures for non-cash items
- Liaise with external auditors to audit the MAP accounts to meet the required submission dates by IFAD;
- Oversee tax matters of the Programme, ensuring that tax exemptions for the procurement of goods for the Programme are secured at the appropriate time;
- Provide any support to assist in procurement for the Programme in accordance with procedures laid down by Financing Agreements of IFAD and government's procurement regulations and guidelines;
- Process documentation and follow up on disbursements from the government and IFAD to ensure that releases are not delayed; Ensure that funds for Programme implementation are disbursed in a timely manner to enable Programme interventions to be carried out on time;
- Prepare and submit regular withdrawal applications to IFAD and follow up to ensure that the Programme does not run short of liquidity;
- Follow up on all Programme funds released to implementing entities and technical partners for timely retirement and proper utilisation;
- Ensure that statements of expenditure (SOEs) are carefully compared for eligibility with relevant financial agreements and the disbursement letter, and with reference to the Programme Design Report for guidance when necessary;
- Ensure that fixed assets are well accounted for and annual verification is undertaken of the condition of assets and their location;
- Prepare half-yearly consolidated statements of Programme accounts as an integral part of the Management Information System to be submitted to the Programme Steering Committee, and subsequently to IFAD;
- Act as a counter-signatory to Programme fund releases as required for Programme financial transactions and also sign as witness to contracts as much as possible;

- Prepare periodic reports regarding aspects of Programme financial monitoring bringing out variances and advising component heads as to the limits of expenditure;
- Ensure the effective and efficient operation of administrative aspects of the MAP;
- Carry out any other activities that are assigned by the Programme Director.

Qualifications

The candidate should have a Bachelor's degree in business or finance, and a professionally qualified accountant with Membership of association body of Chartered Accountants in Maldives. Other qualifications include:

- At least **xx** years of relevant work experience, including at least **xx** as a financial manager or accountant in government/donor projects or large institutions.
- Strong managerial skills and demonstrated capacity to manage people and interact with a wide range of private sector partners and government representatives.
- Knowledge of work planning, budgeting and reporting.
- Computer-literate and well-versed in the use of Excel, Word and financial software.

Position: Monitoring and Evaluation and knowledge management officer

Objective: Enable the PIU to effectively and efficiently implement MAP, including readjustment of the programme if and when needed

Output: Analysis of implementation progress, using management information systems, ORMS, special studies, annual work plans and budgets, regular and technical reports, factsheets and KM instruments and products

Activities

- Establish and maintain systems that guide and assess programme implementation progress, as described in the PIM;
- ensure that the programme monitoring and evaluation will comply with the IFAD-required ORMS and concentrate on selected core indicators (Cis);
- Coordinate preparation of semi-annual progress reports, revised logical framework, annual work plans and budgets and periodic procurement plans;
- Set-up and manage a system whereby programme agreements are periodically reviewed and transfer relevant information into the Programme's MIS;
- Organise reviews and assessments that provide qualitative insights in Programme achievements or lack thereof;
- Plan and coordinate the conduct of surveys and studies at required periodic times during the programme duration, namely at beginning, mid-term and completion, or when it is judged necessary
- Develop and implement an effective mechanism for systematically capturing the good practices and innovative features of the Programme
- Associate with PIU staff, implementing agency staff and beneficiaries to understand the mechanisms through which programme benefits are delivered;
- Signal problems in implementation progress, the Programme's risk profile and the resource utilisation by the Programme;
- Take the leadership in the programme evaluation and guide the related programme partners and staffs in focusing on the key outcome and impact levels
- Identify key issues facing Programme implementation and contribute to the identification of alternative approaches to address the issues.

Qualifications:

- A Master's degree in a field related to agricultural development;

- 10-years' experience in rural development in Malawi, of which five in monitoring and evaluation;
- Experience in Programme administration, financial management and reporting, preferably using IFAD systems;
- Well-versed with approaches for planning, monitoring and evaluation;
- Experience in facilitation of interactive sessions among professionals, aimed at knowledge management;
- Proven ability to constructively interact with teams of professionals from various stakeholders.

Position: Procurement Officer/specialist

Objective: To purchase the best value-for-money equipment and services for the achievement of the MAP targets and objective

Output: Transparent and efficient procurement and contract management.

Activities

Specific responsibilities include but are not limited to the following:

- Installation of appropriate procurement systems and procedures for effective planning and monitoring of procurements under the Programme;
- Communicate to all implementing entities and service provider their responsibilities and requirements with respect to procurement in keeping with prevailing government practices which are acceptable to IFAD;
- Oversee preparation and consolidation of inputs to the Annual Procurement Plan;
- Oversee the contracting process, including ensuring that special panels and evaluation committees of procurement have people with appropriate expertise;
- Monitor implementation of contracts: report status and problems to the Programme Director (PD) on a monthly basis; and intervene to address problem upon request by the PD;
- Maintain all procurement records in a form appropriate for regular auditing. Each procurement package must have its own identifiable procurement file with all the history of documentation from the initiation of the procurement to contract closure;
- Ensure that goods and services financed have been procured in accordance with the financing agreement and the public procurement regulations in the country;
- Work with the Financial Controller/Officer to ensure that tax exemptions for the procurement of goods for the Programme are secured at the appropriate time;
- Prepare periodic reports of progress with implementation of the Procurement Plan, and regularly inform the Programme Director of problems and make proposals to overcome bottlenecks;
- Provide any reports needed by the authority of procurement administration in MOFMRA or in Maldives;
- Carry out any other activities that are assigned by the Programme Director;

Qualifications

The candidate should have a Bachelor's degree in business, finance or related subject, and specific training in procurement and membership of relevant professional bodies. A Master's Degree shall be an added advantage. Other qualifications include:

- At least five years of relevant work experience, preferably including experience in procurement in government/donor investment projects or large institutions;
- Ability to work well in teams and to interact with a wide range of private sector partners and government representatives;
- Knowledge of work planning and reporting;
- Computer-literate and well-versed in the use of Excel and Word.

Position: Targeting, gender and nutrition specialist

Objective: In close collaboration with the component coordinators/specialists, the Targeting and gender specialist is expected to lead the delivery of social impacts to target beneficiaries in MAP

Output: Gender, youth and nutrition-inclusive concerns are reflected are mainstreamed in all aspects of the programme; and reflected in targeting decisions by the programme, its beneficiaries and partner agencies.

Activities

The Specialist will lead a continuous process of targeting and identifying beneficiaries to participate in programme's activities. S/he reports to the Programme Director and works directly with component coordinators, focal points of implementing agencies and partners, Extension Link Farmers as well as various Programme's Service Providers to undertake target group identification and analysis and develop the targeting strategy together with the implementation mechanisms. Key tasks include:

- Identify opportunities in the local governance system for enhancing the targeting of programme benefits to the poor, female-headed households and youth;
- Develop guidance for Programme staff and staff of mobilised agencies on directing programme benefits to the target beneficiaries;
- Contribute to the design of the implementation surveys, tracer and thematic studies in order to gauge the impact of development on differentiated beneficiary categories;
- Identify innovative ways of providing equitable access to resources and opportunities for the disadvantaged groups including female-headed households and youth;
- Identify opportunities for gainful employment for women and youth, from activities undertaken by the programme;
- Assess the capacity of agricultural extension services (both government and service providers) to meet the needs of small farmers in terms of nutrition education, and formulate adequate support measures to improve their performance in servicing the programme's target group;
- Develop detailed gender action plan with the PIU colleagues to help identify, prioritise and sequence the activities required for successful delivery in targeting and gender empowerment;
- Develop joint M&E oversight plan with MAP M&E Specialist and Service Providers to monitor the implementation and efficiency of targeting and gender empowerment;
- Conduct regular field visits to programme implementation areas and provide technical and on the job support to partners, focal points and service providers to ensure the targeting strategy is implemented as planned;
- Develop localised training materials on the relevance of improved nutrition to women and their households;
- Support M&E officer in monitoring and reporting on nutrition outcomes and lead the development of the project's social inclusion/gender strategy;
- Support the development and implementation of nutrition intervention material for the project area in close collaboration with the PD and Component Coordinators/Specialist;
- Provide technical assistance and guidance to field level staff;
- Document lessons learnt and achievements in mainstreaming nutrition in the project.

Qualifications

- MSc degree in Gender Studies, social sciences or similar;
- Ten or more years of relevant professional experience;
- Proven experience in developing strategies for effective gender and poverty-mainstreaming
- Working knowledge of remote area or outer islands, agriculture and value chain development;
- Basic knowledge of global health and nutrition issues and the current trends, methods and approaches;
- Excellent oral & written presentation skills
- Creative, innovative system thinker, with ability to catalyse change.

Position: Accountant

Objective: To administer programme funds in support MAP targets and objective.

Output: Up-to-date financial management, accounting and financial reporting

Activities

Specific responsibilities include but are not limited to the following:

- Support in the preparation of Annual Work Plan and Budget (AWPB)
- Analysing payment requests and reconciliation with approved documentation including purchase orders and contracts
- Posting payment invoices into financial management systems in line with approved work plans.
- Assist in preparation of half-yearly consolidated statements of Programme accounts as an integral part of the Management Information System to be submitted to the programme oversight committee, and subsequently to IFAD.
- Ensure that fixed assets are well accounted for and regular verification is undertaken of the condition of assets and their location.
- Ensure that supporting documents, records and accounts are kept in respect of all Programme activities, with clear linkages between the books of account and the financial statements presented to the financiers;
- Preparation of bank reconciliations for the Programme accounts.
- Assisting in review of invoices and supporting documents before any payments are processed.
- Following up on outstanding advances both to staff and service providers.
- Assisting in ensuring budgetary controls to ensure that no payment is done unless there is sufficient budgetary provision.
- Ensuring systematic and accurate recording/filing of accounting records.
- Prepare the SOE's and the WA Application to IFAD for timely replenishment.
- Participating in the Audit exercises providing auditors will all information and documentation they require
- Any other duties as may be assigned by the Financial management officer/Financial controller.

Qualifications

The candidate should have a Bachelor's degree in business or finance, and an affiliate professional accountant. Other qualifications include:

- At least five years of relevant work experience, including at least four as a financial manager or accountant in government/donor projects or large institutions.
- Knowledge of work planning, budgeting and reporting.
- Computer-literate and well-versed in the use of Excel, Word and financial software.

Position: Assistant Accountant

Objective: To administer programme funds in support MAP targets and objective

Output: Timely logistic and administrative support and up-to-date entry of financial transactions

Activities:

The Assistant Accountant is part of the Finance team and will, under the supervision of the Accountant, take responsibility for maintaining all accounting documentation in good order.

Specific responsibilities include but are not limited to the following:

- Cashiering of Programme funds.
- Prepares payments vouchers and prepare payments upon authorised approvals.
- Agent to MAP accounts in commercial banks

- Maintains petty cash floats for the programme; make payments and prepare a float reimbursement returns.
- Follows up accountabilities of funds advanced at the level PIU and with other implementing partners.
- Ensure systematic and accurate recording/filing of accounts records.
- Ensure that salary and tax deductions are remitted in timely way and that all acknowledgement of receipt is documented.
- Withholding Tax is recovered from payments, remitted and Tax Certificates are issued to suppliers.
- Participates in field supervision of Programme activities.
- Participates in Audits of Programme's Financial Statements.
- Manage the financial and related aspects regarding foreign travel by the staff and other partners under the Programme.
- Any other duties as may be assigned from time to time by the Programme management.

Qualifications

The candidate should have a Bachelor's Degree in Business/ accounting. Other qualifications include:

- Practical experience (at least 3 years) of working in Government and Donor funded project while providing support in enabling smooth functioning of financial transactions is necessary.
- Familiarity with applications of accounting software

Appendix 2: Programme logframe

Logical Framework												
Results Hierarchy	Indicators				Means of Verification			Assumptions				
	Name	Baseline	Mid-Term	End Target	Source	Frequency	Responsibility					
Outreach	1.b Estimated corresponding total number of households members				implementing partners' records and project records	Semi-annual and annual reports	PIU	The programme achieves its geographic and HH outreach targets and small farmers participate in programme activities				
	Household members - Number of people			31,800								
	1.a Corresponding number of households reached											
	Women-headed households - Number		400	1,200								
	Non-women-headed households - Number		1,600	4,800								
	Households - Number		2,000	6,000								
	1 Persons receiving services promoted or supported by the project					Semi-annual and annual reports	PIU					
	Females - Number		1,060	3,180								
	Males - Number		940	2,820								
	Young - Number		400	1,200								
	Total number of persons receiving services - Number of people				implementing partners' records and project records	Semi-annual and annual reports	PIU					
	Male - Percentage (%)		47%	47%								
	Female - Percentage (%)		53%	53%								
	Young - Percentage (%)		20%	20%								

Project Goal Sustainably increased incomes, food security and nutrition status of small farmer households	70% of project supported HHs reporting a 20% increase in their income				surveys of households, qualitative assessment of participating HH	at baseline, mid-term and completion.	PIU	Small farmer HHs undergo the process of behavior change in agriculture and livelihoods
	Number of HHs		400	4,200				
	% of HH reporting improved food security				surveys of households, qualitative assessment of participating HH	at baseline, mid-term and completion.	PIU	
	% of HHs		30%	80%				
Project Objective Enabling environment for sustainable and climate resilient agriculture	# of small farmers reporting access to improved agricultural support services				surveys of households, qualitative assessment of participating HH, technical studies	at baseline, mid-term and completion.	PIU	Gov. consistent policies, strategies and interventions for sustainable and climate-resilient agriculture
	# of female farmers		318	2,544				
	# of male farmers		282	2,256				
	# of young farmers		120	960				
Component 1: Enabling environment for sustainable agricultural development								

Outcome 1. Institutional capacity is strengthened through upgrading the Research and Development Centre in (name of island) and train staff of MACO enabling quality service to be developed and disseminate for adoption by small holder farmers	# of new and improved services in the agricultural institutional support system				Sector studies, evaluations, programme M&E system, progress report, periodic surveys	At baseline, mid-term and completion. Annual records and reports	MOFMRA, MACO, all implementing parties	Effective interventions in conducive policy framework, institutions technical service support system strengthened and successful introduction and adoption of new and better technologies, knowledge and inputs
	# of services		4	10				
Output 1.1 Policy knowledge products on sustainable and climate-resilient agriculture	# of policy-relevant knowledge products completed (research, study, strategy, bylaw)				Porgramme M&E system, periodic reports	Semi-annual and annual reports	PIU and participating agencies	
	# of policy products		1	3				
Output 1.2 Upgraded capacity of generating knowledge and technologies	Types of facilities and equipment for generating knowledge and technologies (ARC in North)				Porgramme M&E system, periodic reports	Semi-annual and annual reports	PIU, ARC and participating agencies	
	# of facilities and equipment		5	9				

Output 1.3. Packages of recommendations developed for enhancing economic return for small holder farmers	# of new production techniques developed and tested				Porgramme M&E system, periodic reports	Semi-annual and annual reports	PIU, ARC and participating agencies	
	# of new and improved technologies		35	75				
Output 1.4 New technologies, quality inputs transferred to smallholder farmers	# of extension linkage farmers trained in production practices and/or technologies				Porgramme M&E system, periodic reports	Semi-annual and annual reports	PIU, ARC and participating agencies	
	# of persons		2,000	6,000				
	# of farmers receiving high quality inputs and technologies				Porgramme M&E system, periodic reports	Semi-annual and annual reports	PIU, MACO and participating agencies	
	# of female farmers		212	2,544				
	# of male farmers		188	2,256				
	# of young farmers							
Output 1.5 Agriculture Information and Communication Technology (AICT) Service Established	# of service platform on agricultural information and communication technology established				Porgramme M&E system, periodic reports	Semi-annual and annual reports	PIU, MACO and participating agencies	
	# of service platform established			1				
Component 2: Production enhancement								
Outcome 2 Better/New	% of HHs reporting adoption of new/improved inputs, technologies or practices				Sector studies, evaluations,	Annual	PIU	Effective training of small

technologies, inputs adopted and productivity improved	% of HHs		20%	70%	programme M&E system, progress report, periodic surveys			farmers on enhanced and organized production, production forums formed and working with adopted technologies and GAPs, and increased access to agriculture financing
Output 2.1 Beneficiaries trained on production practices and/or technologies	# of farmers trained on production practices and/or technologies				Porgramme M&E system, periodic reports	Semi-annual and annual reports	PIU	
	# of males		940	2,820				
	# of females		1,060	3,180				
	# of youth		400	1,200				
Output 2.2 Farmer production forums organized	# of farmer forums organized and supported				Porgramme M&E system, periodic reports	Semi-annual and annual reports	PIU	
	# of forums established and supported		50	75				
	# of farmers participating in production forum				Porgramme M&E system, periodic reports	Semi-annual and annual reports	PIU	
	# Females		980	1470				
	# Males		420	630				
	# Youth		280	420				
	# Women in cluster leadership position		10	15				

Output 2.3 : Increased access to agriculture financing for small farmers	# of farmers accessing to agriculture financing				Programme M&E system, periodic reports	Semi-annual and annual reports	PIU, SDFC, MFLC		
	# of female farmers		245	1,176					
	# of male farmers		105	504					
	# of young farmers		70	336					
Component 3: Market connection									
Outcome 3 Production decisions respond to market opportunities	# of supported agribusiness enterprises reporting increase in profit				Evaluation studies	Semi-annual and annual reports	PIU	PPP operational and supply contracts or contract farming established with effective marketing support	
	# of agribusiness		5	15					
Output 3.1 Supply contracts established between producers and private companies incl. commercial islands	# of supply contracts increased				Programme M&E system, periodic reports	Semi-annual and annual reports	PIU		
	# of supply contracts		5	15					
	# of farmers engaged in supply contract or contract farming				Programme M&E system, periodic reports	Semi-annual and annual reports	PIU		
	# of males		490	735					
	# of females		210	315					
	# of youth		140	210					

Appendix 3: Proposed M&E formats

3-1: AWPB/Progress report cost tables examples:

Table 2.1-1: Detailed cost table by component and by financier

Table N Component N...

Reporting Unit ... Reporting Date: xxx Currency Unit: xxx Implementing Period: xxx - xxx

Implemented by:	Unit	Total project target		Cumulative Achievement			Achiev. Current Period			Financing plan for the planning period					
		Quantity	Cost	Quantity		Amount		Quantity		Amount		IFAD	Financier X	Gov.	Benef
				Quantity	% of target	Value	% of total	Quantity	% of total	Amount	% of total	Currency	Currency	Currency	Currency
Outputs/Activities															
Output/Activity 1															
xxx															
<i>Sub-total</i>															
Output/Activity 2															
xxx															
<i>Sub-total</i>															
Total															

Table 3.1-2 AWPB/progress report xxxx, Summary by Components

Reporting Unit: xxx Reporting Date :xxx Currency Unit: xxx Implementing Period: xxx - xxx

Components	Total target	Cummulative Achiev.		Achiev. Current Period		Finance Resources of current year				
						IFAD	Financer X	Government	Benef.	Total
		values	% of targets	values	% of targets					
Component 1										
Sub component 1.1										
...										
...										
...										
<i>Sub-total</i>										
Component 2										
Sub component 2.1										
...										
<i>Sub-total</i>										
GRAND TOTAL										

Table 3.1-3 AWPB/progress report XXXX, Summary by Expenditure category

Reporting Unit: xxx Reporting Date :xxx Currency Unit: xxx Implementing Period: xxx - xxx

Expenditures	Total target	Cummulative Achiev.		Achiev. Current Period		Finance Resources of current year				
						IFAD Currency	Financier X Currency	Government Currency	Benef. Currency	Total Currency
		values	% of targets	values	% of targets					
Expenditure I										
Expenditure II										
Expenditure III...										
GRAND TOTAL BY EXPENDITURE										

3.2: Monitoring table of beneficiary participation and state of benefit (outreach)

M&E Table: Annual Incremental/Cumulated Beneficiary Households and Activity Participants (Reporting: Semi-Annual and Annually)

Report Unit:

Reporting period: Date/Month/Year -- Date/Month/Year

Components/Activities		No. of islands	No. of forums	Number of beneficiary households*					Number of direct participants (persons)			
				Total	Poorest	Poor	MI	Rich	Total	Male	Female	Youth
Production and Physical Works	A											
	B											
	C											
	D											
	Total											
Technical Training	a											
	b											
	c											
	Total											
Total Programme												

Appendix 4: Outlines of first AWPB

Component 1. Enabling Services

Sub-component 1.1. Knowledge and Technology

No	Description of Activities	Category	Outputs	Budgeted 2020-2021, 000'USD	Financing Source, 000'USD		
					IFAD Loan	IFAD Grant	Govt Budget
1	<u>Upgrading Agriculture R&D Center (North)</u>						
1.1	<i>Equipment and Goods</i>						
1.1.1	Upgrading laboratory facilities (to measure water quality for irrigation, fertility of soils, plant tissue nutrition and identify plant diseases)	I	1 lab	152	137	-	15
1.1.2	Improved greenhouse fitted hydroponic planting gutter space (for humid and hot climate, movable gutter to make space for operation lanes optimizing the use of floor space)		350m2	44	40	-	4
1.1.3	Closed vertical production using artificial light /d		100m2	35	28	-	7
1.1.4	Net houses against insects and shade fitted with hydroponic systems /e		500m2	4	3	-	1
1.1.5	Net houses against bats /f		100m2	1	0	-	0
1.1.6	Concrete apron for compost making		200m2	28	23	-	6
1.1.7	Compost equipment /g		1 unit	25	20	-	5
1.1.8	Open field hydroponic production bucket system using drip (set covers 100 m2)		5 units	0	0	-	0
1.1.9	Reagents, fertilizer, pest control agents (chemicals and biological)		lumpsum	5	4	-	1
1.1.10	Tools like refractometer, tissue and soil nutrition analysis meter, insect catch plates and microscope		lumpsum	5	4	-	1
1.1.11	Open field drip irrigation		5 units	13	10	-	3
1.1.12	Grafting equipment		5 units	3	2	-	1
1.1.13	HDPE drain cell rainwater storage tank dug in to the soil		200m2	30	24	-	6
1.1.14	Rainwater polythene collection sheet with pump sump		500m2	1	0	-	0
1.1.15	Photovoltaic solar system (10 Kw)		1 unit	14	11	-	3
1.1.16	Battery backup (9 KW)		1 unit	8	6	-	2
2	<u>Policy studies</u>	II	1 study	30	-	30	-
3	<u>Knowledge and Technology (AR&DC)</u>						
3.1	<i>Adaptive research (inputs)</i>	II					
3.1.1	Identification of best varieties (various crops)		1 research	4	3	-	0
3.1.2	Establishing best hydroponic fertilisation for greenhouse, closed system and field systems		1 research	4	3	-	1
3.1.3	Establishing best drip fertigation for open fields (annual crops)		1 research	4	3	-	1

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3.1.4	Establishing best drip fertigation for open fields (perennial crops)		1 research	4	3	-	1
3.1.5	Identification of compost amounts for crop production in open field		1 research	4	3	-	1
3.1.6.	Development of IPM recommendations for the various crops in greenhouse, closed system and open field		1 research	4	3	-	1
3.1.7	Development of organic pest recommendations for the various crops in greenhouse, closed system and open field		1 research	4	3	-	1
3.1.8	Preparation of farm budget based on field records for each recommendations developed		1 research	4	3	-	1
3.1.9	Preparation of promotion material videos, pamphlet, prospectus for different systems		10 products	4	3	-	1
3.2	<i>Materials</i>	I	lumpsum	4	3	-	1
3.2.1	Planting material						
4	<u>Knowledge and Technology Transfer</u>						
4.1	<i>Technical assistance (UNOPS)</i>	II					
4.1.1	Chief Technical Advisor		1 consultant hired	146	-	146	-
4.1.2	Unspecified TA		1 consultant hired	66	-	66	-
4.1.3	UNOPS management fee		1 consultant hired	12	-	12	-
4.2	<i>Technical assistance - extension</i>	II					
4.2.1	Development of the MGAP protocols for various crops produces		1 protocol	10	10	-	-
4.2.2	Development of hand book for MGAP implementation		1 handbook	5	5	-	-
4.2.3	Development of produce standards guided by FAO's Codex Alimentarius		1 consultant hired	22	22	-	-
4.3	<i>Technical assistance - other</i>	II					
4.3.1	Establishment of Agriculture Information and Communication Technology (AICT) platform		1 platform established	32	32	-	-
4.3.2	Illustrated training material		10 brochures prepared	15	15	-	-
4.4	<i>Training and workshops</i>	II					
4.4.1	Project awareness on participating island		6 islands covered	3	3	-	-
4.4.2	Assisting farmers to form institutional frame work e.g. farmers' forum for decision making on production		6 islands covered	3	3	-	-
4.4.3	Assisting the Farmers' Forum to select an extension-linkage farmers (farmer to farmer)		6 islands covered	3	3	-	-
4.4.4	Training of selected link farmers (LF)		12 LFs	6	6	-	-
Total				756	443	254	60

Xxx

Component 1. Enabling Services							
Sub-component 1.1. Input Supply							
No	Description of Activities	Category	Outputs	Budgeted 2020-2021, 000'USD	Financing Source, 000'USD		
					IFAD Loan	Govt Budget	MACO
1	<u>MACO institutional capacity building</u> <i>Equipment and goods</i>						
1.1	Walking tractors and implements	I	10 units	25	23	3	
1.1.1	Rain water harvesting and storage systems		1 unit	253	228	25	
1.1.2	Stock of inputs for MACO's supply retail outlet		lumpsum	122	109	12	
1.1.3	Provision of climate resilient planting materials		lumpsum	122	109	12	
1.1.4	Initial stock of greenhouses, closed vertical production units and net houses		60 units	314	282	31	
1.1.5	Reusable plastic crates		lumpsum	30	27	3	
1.1.6	Solar/photovoltaic systems		1 unit	57	51	6	
1.1.7	Drip fertigation system and delivery systems		1 unit	66	59	7	
1.1.8	Initial stock of solar driven cold storage		5 units	177	159	18	
1.2	<i>Training</i>	II					
1.2.1	Training of shop keepers/agriculture extension staff		3 courses	30	30	-	
1.3	<i>Technical assistance</i>	II	6 persons	102	102	-	
1.3.1	Agronomist/extension						
Total				1,298	1,181	117	0

Component 2. Climate Smart Production									
No	Description of Activities	Category	Outputs	Budgeted 2020-2021, 000'USD	Financing Source, 000'USD				
					IFAD Loan	IFAD Grant	MACO	SDFC	Govt Bud
1	<u>Financial products</u>	II							
1.1	Development of financial products		1 consultant hired	6	6	-	-	-	-
1.2	Use of financial products		1 consultant hired	6	6	-	-	-	-
1.3	Understanding and interpretation of agriculture business plans		1 consultant hired	6	6	-	-	-	-
Total				17	17	-	-	-	-

Component 3. Market Connection							
No	Description of Activities	Category	Outputs	Budgeted 2020- 2021, 000'USD	Financing Source, 000'USD		
					IFAD Loan	IFAD Grant	Private Invest
1	<i>Training</i>						
1.2	Food safety and quality (training to vendors at regional market hubs)		1 course	0.253	0.253	-	-
1.3	Contract farming /b		1 course	0.25	0.25	-	-
1.4	MGAP for CAI advisers		1 course	5.06	5.06	-	-
1.5	Contract farming for CAI advisers		1 course	6.08	6.08	-	-
2	<i>Technical assistance</i>	II					
2.1	Development of transparent pricing systems		1 consultant hired	6	6	-	-
2.2	Provision of logistical management support to transport produce to Male		lumpsum	1	1	-	-
3	<i>Market infrastructure investments</i>	III					
3.1	Matching grants: duplication of production systems at the R&DC (to selected CAI at 20% of investment costs)		lumpsum	9	6	3	-
3.2	Matching grants: upgrading cold storage on transport vessels (to selected CAI at 20% of investment costs)		1 cold storage	30	20	11	-
3.1- 3.2	Contribution of CAI for market infrastructure investments			156	-	-	156
Total				213	43	14	156
							-

Component 4. Programme Management						
No	Description of Activities	Category	Outputs	Budgeted 2020-2021, 000'USD	Financing Source, 000'USD	
					IFAD Grant	Govt Budget
1	<u>Equipment and Goods</u>	I	lumpsum	25	-	25
2	<u>Technical Assistance</u>	II	contract	3	-	3
2.1	Internal audit					
3	<u>Staff Training</u>	II	1 course	3	-	3
3.1	Project management					
3.2	Business management					
3.3	Gender focus					
3.4	Innovation enhancement					
3.5	Study tours					
4	<u>Integrated M&E and KM</u>	II	1 course	3	-	3
4.1	<i>Studies and impact assessment</i>					
4.1.1	Development of MIS system					
4.1.2	Baseline study					
4.1.3	Thematic studies					
4.2	<u>KM</u>	II	1 study conducted	20	20	-
4.2.1	Information dissemination seminars and workshops (start-up)					
5	<u>Salaries</u>	IV	lumpsum	3	3	-
5.1	Project Director		1 person hired	24	-	24
5.2	Planning and admin officer		1 person hired	21	-	21
5.3	Policy and institution specialists		1 person hired	21	-	21
5.4	Agriculturalist/extension		1 person hired	21	-	21
5.5	Business development specialist		1 person hired	21	-	21
5.6	Gender and targeting officer		1 person hired	21	-	21
5.7	M&E and KM officer		1 person hired	19	-	19
5.8	Financial management specialist		1 person hired	21	-	21
5.9	Accountant		1 person hired	19	-	19
5.1	Accountant assistant		1 person hired	12	-	12
5.11	Procurement officer		1 person hired	19	-	19
5.12	Support staff		5 persons hired	49	-	49
6	<u>Performance-based incentives (about 20% of base salary based on staff performance)</u>	IV	PBS established	36	36	-
7	<u>Allowances</u>	IV	per annum	8	-	8
8	<u>Operational expenditures</u>	IV				

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8.1	Office running costs (including for PSC meetings, meetings of tender committees, travel and stationeries)		lumpsum office rented	11 5	-	11 5
8.2	Office rent					
	Total			414	72	342

Appendix 5: First procurement plan

PROCUREMENT PLAN (CONSULTANTS))																		
Description	Component	Lot Number	Issue # of Invitation for Bids	BASIC DATA	Estimated Amount IN USD ('000)	Procurement Method	Prior or Post Review	Plan Vs. Actual	Date proposed	Date No-Objection	Bid Invitation Date	Bid Closing Opening	Bid Evalution Report	No Objection	Contract Amount In US \$	Date Contract Award	Date Contract Signature	Time line
Policy Studies	I	MAP/cons/2020-21/01		30.00	Individual Consultant	Prior review	Plan		N.A.									Jun-20
Adaptive Research Studies - 8 Nos	I	MAP/cons/2020-21/02		28.00	Individual Consultants	Post Review	Plan		N.A.									Jun-20
TA- Chief Technical Advisor- UNOPS	I	MAP/cons/2020-21/03		146.00	Single Source	Prior Review	Plan		N.A.									Jul-20
TA- Unspecified- UNOPS	I	MAP/cons/2020-21/04		66.00	Single Source	Prior Review	Plan		N.A.									Jul-20
Development of produce standards guided by FAO's Codex Alimentarius	I	MAP/cons/2020-21/05		22.00	Individual Consultant	Prior Review	Plan		N.A.									Sep-20
Agronomist/ Extension - 6 persons	I	MAP/cons/2020-21/06		102.00	Individual Consultants	Post Review	Plan		N.A.									Jul-20
Development of Financial Products - 3 persons	II	MAP/cons/2020-21/07		18.00	Individual Consultants	Post Review	Plan		N.A.									Oct-20
Development of Transparent Pricing System	III	MAP/cons/2020-21/08		6.00	Individual Consultant	Post Review	Plan		N.A.									Oct-20
Baseline Study	IV	MAP/cons/2020-21/09		20.00	QCBS	Prior Review	Plan		N.A.									Jul-20
MIS Development	IV	MAP/cons/2020-21/10		10.00	QBS	Post Review	Plan											Jun-20
Thematic Studies	IV	MAP/cons/2020-21/11		3.00	Individual Consultant	Post Review	Plan		N.A.									Jul-20
Internal Audit	IV	MAP/cons/2020-21/12		3.00	QBS	Post Review	Plan		N.A.									Jul-20
Total Cost				454.00														

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PROCUREMENT PLAN (GOODS)																
BASIC DATA			Bid Documents			Bidding Period		Bid Evaluation		Contract Finalization			Time line			
Description	Lot Number	Issue # of Invitation for Bids	Estimated Amount in USD'000	Procurement Method	Prior or Post Review	Plan Vs. Actual	Date proposed	Date No-Objection	Bid Invitation Date	Bid Closing Opening	Bid Evaluation Report	No Objection	Contract Amount In US \$	Date Contract Award	Date Contract Signature	
Equipment & Goods for Research Lab	MAP/Good s/2020-21/1		152.00	National Competitive Bidding	Prior Review	Plan	Jun	Jun	Jun	Jul	Jul	Jul				Jul-20
						Actual										
Equipment for Green House	MAP/Good s/2020-21/2		215.00	National Competitive Bidding	Prior Review	Plan	Jul	Jul	Jul	Aug	Aug	Aug				Aug-20
						Actual										
Planting Material	MAP/Good s/2020-21/3		4.00	Direct Contracting	Post Review	Plan	N.A	N.A	N.A	N.A	N.A	N.A				Aug-20
						Actual										
Tractors & implements- MACO	MAP/Good s/2020-21/4		25.00	National Competitive Bidding	Prior Review	Plan	Aug	Aug	Sep	Sep	Sep	Sep				Sep-20
						Actual										
Rainwater Harvesting and storage systems- MACO	MAP/Good s/2020-21/5		253.00	National Competitive Bidding	Prior Review	Plan	Aug	Aug	Sep	Sep	Sep	Sep				Sep-20
						Actual										
Inputs & planting materials- MACO	MAP/Good s/2020-21/6		243.00	National Competitive Bidding	Prior Review	Plan	Sep	Sep	Oct	Oct	Oct	Oct				Oct-20
						Actual										
Greenhouses & equipment- MACO	MAP/Good s/2020-21/7		467.00	National Competitive Bidding	Prior Review	Plan	Sep	Sep	Oct	Oct	Oct	Oct				Oct-20
						Actual										
Solar driven Cold storage-MACO	MAP/Good s/2020-21/8		177.00	National Competitive Bidding	Prior Review	Plan	Oct	Oct	Nov	Nov	Nov	Nov				Nov-20
						Actual										
Duplication of Production systems	MAP/Good s/2020-21/9		9.00	Local Shopping	Post Review	Plan	N.A	N.A	N.A	N.A	N.A	N.A				Dec-20
						Actual										
Upgrading Cold storage	MAP/Good s/2020-21/10		30.00	Local Shopping	Prior Review	Plan	N.A	N.A	N.A	N.A	N.A	N.A				Dec-20
						Actual	Oct	Oct	Nov	Nov	Dec	Dec				
Total Cost			1,575.00													

Appendix 6: Detailed cost tables by component

Table 1. Knowledge and Technology

Detailed Costs
 (USD)

I. Investment Costs

A. Upgrading Agriculture Research Center (North) /a

1. Equipment and Goods

- Upgrading laboratory facilities /b
- Improved greenhouse fitted hydroponic planting gutter space /c
- Closed vertical production using artificial light /d
- Net houses against insects and shade fitted with hydroponic systems /e
- Net houses against bats /f
- Concrete apron for compost making
- Compost equipment /g
- Open field hydroponic production bucket system using drip (set covers 100 m2) /h
- Reagents, fertilizer, pest control agents (chemicals and biological)
- Tools like refractometer, tissue and soil nutrition analysis meter, insect catch plates and microscope
- Open field drip irrigation
- Grafting equipment
- HDPE drain cell rainwater storage tank dug in to the soil
- Rainwater polythene collection sheet with pump sump
- Photovoltaic solar system (10 Kw)
- Battery backup (9 KW)

Subtotal Equipment and Goods

B. Policy studies

C. Knowledge and Technology (ARC)

1. Adaptive research (inputs)

- Identification of best varieties (various crops)
- Establishing best hydroponic fertilisation for greenhouse, closed system and field systems
- Establishing best drip fertigation for open fields (annual crops)
- Establishing best drip fertigation for open fields (perennial crops)
- Identification of compost amounts for crop production in open field
- Development of IPM recommendations for the various crops in greenhouse, closed system and open field
- Development of organic pest recommendations for the various crops in greenhouse, closed system and open field
- Preparation of farm budget based on field records for each recommendations developed
- Preparation of promotion material videos, pamphlet, prospectus for different systems /i

Subtotal Adaptive research (inputs)

2. Materials

- Planting material /j

Subtotal Knowledge and Technology (ARC)

D. Knowledge and Technology Transfer

1. Technical assistance (UNOPS)

- Chief Technical Advisor
- Unspecified TA
- UNOPS management fee

Subtotal Technical assistance (UNOPS)

2. Technical assistance - extension

- Development of the MGAP protocols for various crops produces
- Development of hand book for MGAP implementation
- Development of produce standards guided by FAO's Codex Alimentarius

Subtotal Technical assistance - extension

3. Technical assistance - other

- Establishment of Agriculture Information and Communication Technology (AICT) platform
- Illustrated training material /k

Subtotal Technical assistance - other

4. Training and workshops

- Project awareness on participating island
- Assisting farmers to form institutional frame work e.g. farmers' forum for decision making on production
- Assisting the Farmers' Forum to select an extension-linkage farmers (farmer to farmer)
- Training of selected link farmers (LF)

Subtotal Training and workshops

Subtotal Knowledge and Technology Transfer

Total

Unit	Quantities					Total Unit Cost	Totals Including Contingencies ('000)						
	PY1	PY2	PY3	PY4	PY5		PY1	PY2	PY3	PY4	PY5	Total	
lumpsum	1	-	-	-	-	1	150,000	152	-	-	-	152	
m2	350	-	-	-	-	350	125	44	-	-	-	44	
m2	100	-	-	-	-	100	345	35	-	-	-	35	
m2	500	-	-	-	-	500	7	4	-	-	-	4	
m2	100	-	-	-	-	100	6	1	-	-	-	1	
m2	200	-	-	-	-	200	140	28	-	-	-	28	
set	1	-	-	-	-	1	25,000	25	-	-	-	25	
set	5	5	-	-	-	10	35	0	0	-	-	0	
lumpsum	1	1	1	1	1	5	5,500	6	6	6	6	29	
lumpsum	1	-	-	-	-	1	5,000	5	-	-	-	5	
set	5	-	-	-	-	5	2,500	13	-	-	-	13	
set	5	-	-	-	-	5	500	3	-	-	-	3	
m3	200	-	-	-	-	200	150	30	-	-	-	30	
m2	500	-	-	-	-	500	1	1	-	-	-	1	
set	1	-	-	-	-	1	13,800	14	-	-	-	14	
set	1	-	-	-	-	1	7,800	8	-	-	-	8	
lumpsum	1	1	1	1	-	4	30,000	30	31	32	33	-	126
lumpsum	1	1	1	1	-	4	368	6	6	6	6	392	
lumpsum	1	1	1	1	-	4	30,000	30	31	32	33	-	126
lumpsum	1	1	1	1	1	5	3,500	4	4	4	4	19	
lumpsum	1	1	1	1	1	5	3,500	4	4	4	4	19	
lumpsum	1	1	1	1	1	5	3,500	4	4	4	4	19	
lumpsum	1	1	1	1	1	5	3,500	4	4	4	4	19	
lumpsum	1	1	1	1	1	5	3,500	4	4	4	4	19	
lumpsum	1	1	1	1	1	5	3,500	4	4	4	4	19	
lumpsum	1	1	1	1	1	5	3,500	4	4	4	4	19	
lumpsum	1	1	1	1	1	5	3,500	4	4	4	4	19	
lumpsum	1	1	1	1	1	5	3,500	4	4	4	4	19	
lumpsum	1	1	1	1	1	5	3,500	4	4	4	4	19	
lumpsum	1	1	1	1	1	5	3,500	4	4	4	4	19	
lumpsum	1	1	1	1	1	5	3,500	4	4	4	4	19	
lumpsum	1	1	1	1	1	5	3,500	4	4	4	4	19	
lumpsum	1	1	1	1	1	5	3,500	4	4	4	4	19	
lumpsum	1	1	1	1	1	5	3,500	4	4	4	4	19	
pers-month	12	12	-	-	-	24	12,000	146	149	-	-	-	295
pers-month	5	5	-	-	-	10	13,000	66	67	-	-	-	133
pers-month	-	-	-	-	-	-	-	12	12	-	-	-	24
						223	229	-	-	-	-	-	452
lumpsum	1	1	-	-	-	22	10,000	10	10	-	-	-	21
lumpsum	1	1	-	-	-	22	5,000	5	5	-	-	-	10
pers-month	2	-	-	-	-	2	11,000	22	-	-	-	-	22
						37	16	-	-	-	-	-	53
lumpsum	1	1	-	-	-	22	32,000	32	33	-	-	-	66
lumpsum	1	1	-	-	-	22	14,500	15	15	-	-	-	30
						47	48	-	-	-	-	-	95
island	6	10	10	-	-	26	500	3	5	5	-	-	14
island	6	10	10	-	-	26	500	3	5	5	-	-	14
island	6	10	10	-	-	26	500	3	5	5	-	-	14
1LF/island	12	20	20	-	-	52	500	6	10	11	-	-	27
						15	26	27	-	-	-	-	68
						323	319	27	-	-	-	-	668
Total						756	392	102	77	45	1,372		

Republic of Maldives
Maldives Agribusiness Programme (MAP)
Project Implementation Manual (DRAFT)

- la To undertake adaptive and collaborative climate smart research
- lb To measure water quality for irrigation, fertility of soils, plant tissue nutrition and identify plant diseases
- lc For humid and hot climate, movable gutter to make space for operation lanes optimizing the use of floor space.
Unit cost cover installation of foundation, floor, packaging, bath and toilet facilities worth about \$7000.
- ld Unit cost cover installation of foundation, floor, packaging, bath and toilet facilities worth about \$7000.
- le To be used for research cultivation spices and herbs and forestry products including chilli, different herbs, agro forestry products like nuts and fruits and other identified forest product which can be cultivated. /It will also be used to determine spacing of trees intercropped with field crops.
- lf For fruit production including mango, papaya, passion fruit, banana, Noni.
- lg Compost equipment including small orchard tractor and full set of implement, trailer and compost making equipment-chopper and turner.
- lh For different crops and fruits
- li Prepare promotion material videos, pamphlets, prospectus for different systems i.e. greenhouse, closed system, open fields and agro forestry. All material should include simple benefit cost analysis and for capital investment more detailed financial analysis. The prospectus will include scenarios for small farmers using own equity, purchase-hire, and/or debt financing or a mix of the different type of financing.
- lj This work should make use of planting material available from international research institutions and from the commercial market. Identifying and developing hybrid coconuts will receive special attention.
- lk Also for use in the AICT

Table 2. Input Supply

Detailed Costs

(USD)

I. Investment Costs

A. MACO institutional capacity building

1. Equipment and goods

	Unit	PY1	PY2	PY3	PY4	PY5	Total	Unit Cost	PY1	PY2	PY3	PY4	PY5	Total	Disb. Acct.
Walking tractors and implements	lumpsum	10	-	-	-	-	10	2,500	25	-	-	-	-	25	EG_DA
Rain water harvesting and storage systems	lumpsum	1	-	-	-	-	1	250,000	253	-	-	-	-	253	EG_DA
Stock of inputs for MACO's supply retail outlet	lumpsum	1	-	-	-	-	1	120,000	122	-	-	-	-	122	EG_DA
Provision of climate resilient planting materials	lumpsum	1	-	-	-	-	1	120,000	122	-	-	-	-	122	EG_DA
Initial stock of greenhouses, closed vertical production units and net houses /	lumpsum	1	-	-	-	-	1	310,000	314	-	-	-	-	314	EG_DA
Reusable plastic crates	lumpsum	1	-	-	-	-	1	30,000	30	-	-	-	-	30	EG_DA
Solar/photovoltaic systems	lumpsum	1	-	-	-	-	1	56,000	57	-	-	-	-	57	EG_DA
Drip fertigation system and delivery systems	lumpsum	1	-	-	-	-	1	65,000	66	-	-	-	-	66	EG_DA
Initial stock of solar driven cold storage	lumpsum	1	-	-	-	-	1	175,000	177	-	-	-	-	177	EG_DA
Subtotal Equipment and goods									1,165	-	-	-	-	1,165	

2. Training

Training of shop keepers/agriculture extension staff	course	3	3	3	-	-	9	10,000	30	31	32	-	-	93	TRW_DA
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3. Technical assistance

Agronomist/extension /b	pers-month	84	84	84	84	84	420	1,200	102	105	107	110	113	536	TA_DA
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Total

\a 60 units

\b The ARC hire and train 6 agronomist/extension staff (eventually to be staff of MACO when established. The project will finance 100% Y1, 90% Y2, 80% Y3, 70% in Y4 and 50% in Y5.

Table 3. Climate Smart Production

Detailed Costs

(USD)

I. Investment Costs

A. Training of farmers

	Unit	PY1	PY2	PY3	PY4	PY5	Total	Unit Cost	PY1	PY2	PY3	PY4	PY5	Total
IPM training and use&handling of chemical crop protection	course	-	12	20	20	-	52	250	-	3	5	5	-	14
MGAP and group certification	course	-	12	20	20	-	52	250	-	3	5	5	-	14
Management of fertilizer use	course	-	12	20	20	-	52	250	-	3	5	5	-	14
Pruning	course	-	12	20	20	-	52	250	-	3	5	5	-	14
Compost making	course	-	12	20	20	-	52	250	-	3	5	5	-	14
Rain harvesting	course	-	12	20	20	-	52	250	-	3	5	5	-	14
Use and management of field drip irrigation	course	-	12	20	20	-	52	250	-	3	5	5	-	14
Use and management of field hydroponic	course	-	12	20	20	-	52	250	-	3	5	5	-	14
Grafting	course	-	12	20	20	-	52	250	-	3	5	5	-	14
Mulching	course	-	12	20	20	-	52	250	-	3	5	5	-	14
Refresher training	course	-	-	12	20	20	52	250	-	-	3	5	6	14
Subtotal Training of farmers									-	31	56	60	6	153

B. Financial products

Development of financial products	pers-month	0.5	0.5	-	-	-	1	11.000	6	6	-	-	-	11
Use of financial products	pers-month	0.5	0.5	-	-	-	1	11.000	6	6	-	-	-	11
Understanding and interpretation of agriculture business pla	pers-month	0.5	0.5	-	-	-	1	11.000	6	6	-	-	-	11

Subtotal Financial products

C. Production investments

Matching grants /a	lumpsum	-	1	1	-	-	2	350.000	-	350	350	-	-	700
SDFC financing	lumpsum								-	261	1,650	1,650	1,700	5,261
Subtotal Production investments									-	611	2,000	1,650	1,700	5,961

Total

17 659 2,056 1,710 1,706 6,148

\a Up to 20% of the investment value. To substitute farmers equity for investments if deem necessary. The project will provide matching grants amounting to about

USD 700K or approx 500 investment proposals in the first 2 years of the MAP to promote energy saving and climate change adaptation technologies.

Table 4. Market Connection

Detailed Costs
 (USD)

I. Investment Costs

A. Market Connection

1. Equipment and goods

Value-chain infrastructure: cold storage (MACO)

	Unit	Quantities					Totals Including Contingencies ('000)							
		PY1	PY2	PY3	PY4	PY5	Total	Unit Cost	PY1	PY2	PY3	PY4	PY5	Total
	lumpsum	-	1	1	1	1	4	35.000	-	36	37	38	39	151
2. Training														
Food safety and quality /a	course	1	3	3	3	3	13	250	0	1	1	1	1	3
Contract farming /b	course	1	7	8	16	-	32	250	0	2	2	4	-	9
MGAP for CAI advisers	course	1	1	1	1	-	4	5.000	5	5	5	5	-	21
Contract farming for CAI advisers	course	1	1	-	-	-	2	6.000	6	6	-	-	-	12
Subtotal Training									12	14	8	11	1	45
3. Technical assistance														
Development of transparent pricing systems	pers-month	0.5	0.5	-	-	-	1	11.000	6	6	-	-	-	11
Provision of logistical management support to transport produce to	lumpsum								1	2	1	-	-	4
Subtotal Technical assistance									6	8	1	-	-	15
4. Market infrastructure investments														
Matching grants: duplication of production systems at the ARC /c	lumpsum	1	4	9	1	-	15	9.000	9	36	81	9	-	135
Matching grants: upgrading cold storage on transport vessels /d	lumpsum	1	1	1	1	1	5	30.000	30	30	30	30	30	150
Contribution of CAI and MFLS for market infrastructure investments	lumpsum								156	264	444	156	120	1,140
Subtotal Market infrastructure investments									195	330	555	195	150	1,425
Total									213	388	602	244	190	1,637

\a Training to vendors at regional market hubs

\b Support for Commercial Agriculture Islands (CAI) to engaged farmer from other island in contract farming

\c To selected CAI at up to 20% of investment costs.

\d To selected CAI at up to 20% of investment costs.

Table 5. Programme Management

Detailed Costs

(USD)

I. Investment Costs

A. Equipment and Goods

B. Technical Assistance

1. Internal audit

2. Short-term TA /a

Subtotal Technical Assistance

C. Staff Training

Project management

Business management

Gender focus

Innovation enhancement

Study tours

Subtotal Staff Training

D. Integrated M&E and KM

1. Studies and impact assessment

Development of MIS system

Baseline study

Mid-term review

Project completion report

Thematic studies

Subtotal Studies and impact assessment

2. KM

Publications and printing /b

Information dissemination seminars and workshops

Subtotal KM

Subtotal Integrated M&E and KM

Total Investment Costs

	Unit	Quantities					Totals Including Contingencies ('000)							
		PY1	PY2	PY3	PY4	PY5	Total	Unit Cost	PY1	PY2	PY3	PY4	PY5	Total
I. Investment Costs														
A. Equipment and Goods	lumpsum	1	-	-	-	-	1	25.000	25	-	-	-	-	25
B. Technical Assistance	lumpsum	1	1	1	1	1	5	3.000	3	3	3	3	3	16
1. Internal audit	lumpsum	-	-	1	1	1	3	5.000	-	-	5	5	6	16
Subtotal Technical Assistance									3	3	9	9	9	32
C. Staff Training	lumpsum	1	1	-	-	-	2	3.000	3	3	-	-	-	6
Project management	lumpsum	1	1	-	-	-	2	3.000	3	3	-	-	-	6
Business management	lumpsum	1	1	-	-	-	2	3.000	3	3	-	-	-	6
Gender focus	lumpsum	1	1	-	-	-	2	3.000	3	3	-	-	-	6
Innovation enhancement	lumpsum	1	1	-	-	-	2	3.000	3	3	-	-	-	6
Study tours	lumpsum	1	-	1	-	1	3	10.000	10	-	11	-	11	32
Subtotal Staff Training									22	12	11	-	11	57
D. Integrated M&E and KM														
1. Studies and impact assessment	study								10	-	-	-	-	10
Development of MIS system	study								20	-	-	-	-	20
Baseline study	study								-	-	16	-	-	16
Mid-term review	study								-	-	-	-	-	28
Project completion report	study								-	-	-	-	-	28
Thematic studies	study	1	1	1	-	-	3	3.000	3	3	3	-	-	9
Subtotal Studies and impact assessment									33	3	19	-	28	84
2. KM														
Publications and printing /b	lumpsum	-	1	1	1	1	4	3.000	-	3	3	3	3	13
Information dissemination seminars and workshops	lumpsum	1	1	1	1	1	5	3.000	3	3	3	3	3	16
Subtotal KM									3	6	6	7	7	29
Subtotal Integrated M&E and KM									36	9	26	7	35	113
Total Investment Costs									87	25	45	15	55	227

Table 5 continued

II. Recurrent Costs

A. Salaries

Project Director	pers-month	12	12	12	12	12	60 ^a	2.000	24	25	26	26	27	128
Planning and admin officer	pers-month	12	12	12	12	12	60 ^a	1.700	21	21	22	22	23	109
Policy and institution specialist	pers-month	12	12	12	12	12	60 ^a	1.700	21	21	22	22	23	109
Agriculturalist/extension	pers-month	12	12	12	12	12	60 ^a	1.700	21	21	22	22	23	109
Business development specialist	pers-month	12	12	12	12	12	60 ^a	1.700	21	21	22	22	23	109
Targeting gender officer	pers-month	12	12	12	12	12	60 ^a	1.700	21	21	22	22	23	109
M&E and KM officer	pers-month	12	12	12	12	12	60 ^a	1.600	19	20	20	20	21	102
Financial management specialist	pers-month	12	12	12	12	12	60 ^a	1.700	21	21	22	22	23	109
Accountant	pers-month	12	12	12	12	12	60 ^a	1.600	19	20	20	20	21	102
Accountant assistant	pers-month	12	12	12	12	12	60 ^a	1.000	12	12	13	13	13	64
Procurement officer	pers-month	12	12	12	12	12	60 ^a	1.600	19	20	20	21	21	102
Support staff	pers-month	60	60	60	60	60	300 ^b	800	49	50	51	52	54	255
Subtotal Salaries									267	274	281	288	295	1,405
B. Performance-based incentives /d	lumpsum	1	1	1	1	1	5 ^c	36.000	36	36	36	36	36	180
C. Allowances	per annum	1	1	1	1	1	5 ^c	8.000	8	8	9	9	9	43
D. Operational expenditures														
Office running costs /e	lumpsum	1	1	1	1	1	5 ^c	10.000	11	11	11	11	12	56
Office rent	lumpsum	1	1	1	1	1	5 ^c	5.000	5	5	6	6	6	28
Subtotal Operational expenditures									16	16	17	17	18	84
Total Recurrent Costs									327	335	342	350	358	1,711
Total									414	360	387	365	412	1,938

\a On a need basis (gender, youth, IT, environmental issues, climate change, KM, etc.)

\b Content will be developed under Component 1.

\c Includes start-up, completion and annual workshops, M&E, and exchange of project experiences.

\d About 15% of base salary based on staff performance (professional staff).

\e Including for PSC meetings, meetings of tender committees, travel and stationeries



Investing in rural people

Maldives

Maldives Agribusiness Programme

Project Design Report

Annex 9: Integrated Project Risk Matrix (IPRM)

Mission Dates: 12 - 29 November 2019

Document Date: 22/06/2020

Project No. 2000002416

Report No. 0000

Asia and the Pacific Division
Programme Management Department

Overall Summary

Risk Category / Subcategory	Inherent risk	Residual risk
Country Context	Substantial	Substantial
Political Commitment		No risk envisaged
Governance	Moderate	Low
Macroeconomic		No risk envisaged
Fragility and Security	High	High
Sector Strategies and Policies	Moderate	Low
Policy alignment		No risk envisaged
Policy Development and Implementation	Moderate	Low
Environment and Climate Context	High	Substantial
Project vulnerability to environmental conditions	Substantial	Low
Project vulnerability to climate change impacts	High	High
Project Scope		No risk envisaged
Project Relevance		No risk envisaged
Technical Soundness		No risk envisaged
Institutional Capacity for Implementation and Sustainability	Substantial	Low
Implementation Arrangements	Substantial	Low
Monitoring and Evaluation Arrangements		No risk envisaged
Financial Management	Substantial	Moderate
Organization and Staffing	Moderate	Moderate
Budgeting	Moderate	Moderate
Funds Flow/Disbursement Arrangements	Substantial	Moderate
Internal Controls	Substantial	Moderate
Accounting and financial reporting	High	Substantial
External Audit	Moderate	Moderate
Project Procurement	Moderate	Low
Legal and Regulatory Framework		No risk envisaged
Accountability and Transparency		No risk envisaged
Capability in Public Procurement	Moderate	Low
Public Procurement Processes		No risk envisaged
Environment, Social and Climate Impact	Substantial	Low
Biodiversity Conservation		No risk envisaged
Resource Efficiency and Pollution Prevention	Moderate	Low
Cultural Heritage		No risk envisaged
Indigenous People		No risk envisaged

Risk Category / Subcategory	Inherent risk	Residual risk
<i>Labour and Working Conditions</i>		<i>No risk envisaged</i>
<i>Community Health and Safety</i>		<i>No risk envisaged</i>
<i>Physical and Economic Resettlement</i>		<i>No risk envisaged</i>
<i>Greenhouse Gas Emissions</i>		<i>No risk envisaged</i>
<i>Vulnerability of target populations and ecosystems to climate variability and hazards</i>	<i>High</i>	<i>Low</i>
Stakeholders	Moderate	Low
<i>Stakeholder Engagement/Coordination</i>	<i>Moderate</i>	<i>Low</i>
<i>Stakeholder Grievances</i>		<i>No risk envisaged</i>
Overall	Substantial	Moderate

Country Context	Substantial	Substantial
Political Commitment		<i>No risk envisaged</i>
There is full political commitment for MAP		
Governance	Moderate	Low
Risk: Weak agriculture sector governance and institutions may undermine implementation.	Moderate	Low
Mitigations: 1. institutional strengthening 2. Island Farmer Forums 3. FM/procurement compliance 4. internal/external audit		
Macroeconomic		<i>No risk envisaged</i>
MAP will have a very positive macroeconomic impact by reducing the current account deficit		
Fragility and Security	High	High
Risk: The global spread of coronavirus will substantially reduce tourism income, with adverse effects on the Government budget. The fiscal deficit will expand sharply in the short term.	High	High
Mitigations: This risk is exogenous and cannot be mitigated. However, MAP will increase national food production and help to reduce the current account deficit.		
Sector Strategies and Policies	Moderate	Low
Policy alignment		<i>No risk envisaged</i>

MAP is fully aligned with Government policy		
Policy Development and Implementation	Moderate	Low
Risk: Government policy for agri. sector is evolving. Weak implementation of Agriculture Development Master Plan.	Moderate	Low
Mitigations: 1. policy strengthening 2. sector incentive framework 3. investment across sector 4. modernisation/commercialisation 5. Master Plan alignment 6. RBA partnerships		
Environment and Climate Context	High	Substantial
Project vulnerability to environmental conditions	Substantial	Low
Risk: Groundwater over-extraction, misuse of fertiliser and pesticides, coastal erosion are risks.	Substantial	Low
Mitigations: 1. rainwater harvesting 2. water treatment protocols 3. balanced fertiliser use 4. IPM/biological control 5. resilient planting materials 6. intercropping with legumes 7. improved soil productivity 8. improved soil water retention		
Project vulnerability to climate change impacts	High	High
Risk: Maldives is vulnerable to unpredictable rainfall, global warming, sea level rise, extreme weather events.	High	High
Mitigations: 1. drought tolerant cropping 2. vertical hydroponic systems 3. enclosed greenhouses 4. water harvesting 5. drip irrigation/efficiency 6. island-level integrative approach 7. flood-proofing of infrastructure 8. solar energy systems 9. CC institutional awareness		
Project Scope		No risk envisaged
Project Relevance		No risk envisaged
MAP is well aligned with the strategic objectives of the CSN and with all relevant national policies and strategies, such as the Agricultural Development Master Plan and the National Spatial Plan.		
Technical Soundness		No risk envisaged

The project will adapt and introduce climate smart technological solutions suitable for the Maldives, which overcome land/soil constraints and mitigate against climate change, which are well-tested and available globally.		
Institutional Capacity for Implementation and Sustainability	Substantial	Low
Implementation Arrangements	Substantial	Low
Risk: MOFMRA has weak programme implementation capacity.	Substantial	Low
Mitigations: 1. PIU with strong appointed staff 2. UNOPS providing robust TA 3. intensive IFAD oversight/support		
Monitoring and Evaluation Arrangements		No risk envisaged
MAP M&E will benefit from strong Technical Assistance		
Financial Management	Substantial	Moderate
Organization and Staffing	Moderate	Moderate
Risk: Risk of Inadequate FM staff in MoFMRA. Familiarity with IFAD processes and reporting formats.	Moderate	Moderate
Mitigations: • Adequate finance staff with clear job description and accountability lines. • Specific training. • Comprehensive, user-friendly software and PIM.		
Budgeting	Moderate	Moderate
Risk: Risk of not adherence to timely AWPB preparation with activities by components, financiers and cost categories and monitoring physical and financial progress.	Moderate	Moderate
Mitigations: • To ensure proper process of preparation of AWPB using the bottom-up approach and regular review of the physical and financial progress • Budgets will be developed by each implementing agency using the agreed work planning templates and as defined in the Financial Management Manual. • The project cost tables will serve as a reference for the preparation of AWPBs. • The PIU will need to provide their own annual work plan supporting budgets. These will be used to develop the cash flow of the project.		
Funds Flow/Disbursement Arrangements	Substantial	Moderate

Risk: Possible delays in providing funds by the Govt and the PIU to the implementing partners	Substantial	Moderate
Mitigations: • The PIU will ensure that the fund flow for the project is timely. The FM staff of the PIU will carry out review of the implementing partners for fund requirement		
Internal Controls	Substantial	Moderate
Risk: The risk of Inadequacy of internal controls for the type of activities to be carried out by the project	Substantial	Moderate
Mitigations: • Segregation of fiduciary -sensitive duties; • Periodic reconciliations; • Restricting access to accounting files and documents; • Periodic count of inventories and fixed assets.		
Accounting and financial reporting	High	Substantial
Risk: Accounting: The risk that accounting systems – including polices and standards – are not integrated and reliable, leading to inaccuracies in financial records. Reporting: The financial reporting is to be comprehensive and timely and facilitate decision making. The lack of appropriate financial information reduces its utility for monitoring implementation of activities.	High	Substantial
Mitigations: • Accountant will need to be proficient in the use of the accounting software; • Back-up of accounting records; • Use of registry of fixed assets; • Project Implementation Manual (PIM) to detail reporting and monitoring requirements and rules; • Use of financial statements templates consistent with IFAD reporting requirements.		
External Audit	Moderate	Moderate
Risk: The risk that independent and competent oversight of the Project financial statements is not in place or performed timely leading to possible misrepresentation of the financial results and/or suspension or other remedies due to compliance breaches.	Moderate	Moderate

Mitigations: <ul style="list-style-type: none"> • The auditor will be the Office of the Auditor General, Maldives • Ensure reporting as required by IFAD Guidelines • Prompt implementation of auditor's recommendations. 		
Project Procurement	Moderate	Low
Legal and Regulatory Framework		No risk envisaged
No risk envisaged		
Accountability and Transparency		No risk envisaged
No risk envisaged		
Capability in Public Procurement	Moderate	Low
Risk: MOFMRA and PIU have limited procurement capacity. Standard bidding documents not available for all procurement methods. Bid submission timelines differ from those required by IFAD.	Moderate	Low
Mitigations: 1. full-time procurement specialist 2. strengthened PIU capacity 3. strong TA support from UNOPS 4. use IFAD standard bid documents 5. use IFAD bid submission timelines 6. intensive IFAD oversight/support		
Public Procurement Processes		No risk envisaged
No risk envisaged		
Environment, Social and Climate Impact	Substantial	Low
Biodiversity Conservation		No risk envisaged
no risk envisaged		
Resource Efficiency and Pollution Prevention	Moderate	Low
Risk: The programme may damage fragile groundwater aquifers.	Moderate	Low
Mitigations: 1. rainwater harvesting 2. water treatment protocols 3. balanced fertiliser use 4. IPM and biological control 5. discourage groundwater extraction		
Cultural Heritage		No risk envisaged
no risk envisaged		
Indigenous People		No risk envisaged

no risk envisaged		
Labour and Working Conditions		No risk envisaged
no risk envisaged		
Community Health and Safety		No risk envisaged
no risk envisaged		
Physical and Economic Resettlement		No risk envisaged
no risk envisaged		
Greenhouse Gas Emissions		No risk envisaged
no risk envisaged		
Vulnerability of target populations and ecosystems to climate variability and hazards	High	Low
Risk: The programme may increase the exposure of farming to climate variability and hazards due to the increasing impacts of climate change.	High	Low
Mitigations: 1. drought tolerant cropping 2. vertical hydroponic systems 3. enclosed greenhouses 4. water harvesting 5. drip irrigation/efficiency 6. island-level integrative approach 7. flood-proofing of infrastructure 8. solar energy systems 9. CC institutional awareness		
Stakeholders	Moderate	Low
Stakeholder Engagement/Coordination	Moderate	Low
Risk: Insufficient consultation with stakeholders may undermine implementation and achievement of objectives.	Moderate	Low
Mitigations: 1. inclusive targeting 2. intensive stakeholder involvement 3. consultation in planning/execution 4. Island Farmer Forums 5. participatory nature of ELFs 6. intensive IFAD oversight/support 7. annual institutional assessments 8. outsourced evaluations		
Stakeholder Grievances		No risk envisaged
no risk envisaged		



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Annex 10: Exit Strategy

Mission Dates: 12 - 29 November 2019

Document Date: 22/06/2020

Project No. 2000002416

Report No. 0000

Asia and the Pacific Division
Programme Management Department

Annex 10: Exit strategy and sustainability

1. *Exit strategy.* The programme's exit strategy is to systematically ensure the financial, sectoral, institutional, nutritional, technical and environmental sustainability of its activities, to the point where programme interventions are no longer required.
2. *Sustainability.* The design of MAP integrates substantial elements to assure the financial, institutional, nutritional, technical and environmental sustainability of the programme.
 - *Financial sustainability.* The underlying commercial business relationships to be fostered among input supply, extension, financing, production and markets, supplemented by enhanced logistics, provide a solid foundation for financial sustainability. Once profitable business relationships among value chain actors are structured and operational, programme interventions will no longer be required. The market is significant and assured, considering that 95% of food is currently imported, that local demand is rising rapidly as incomes increase, and that the tourism sector imports substantial volumes of agricultural commodities.
 - *Sectoral sustainability.* MAP will contribute to developing a structured policy environment and incentive framework for the agriculture sector led by MOFMRA, a strengthened institutional support system through MACO and ARC, and group-based ELF extension through ARC and commercial islands. The entire agriculture sector will thus be upgraded, with nationwide benefits outlasting the programme.
 - *Institutional sustainability.* The representation, advocacy and operational functions of Island and Regional Farmer Forums will ensure the sustainability of the strengthened interface of farmers with MOFMRA and with services, financing, logistics and markets. Once these Forums have developed relationships across the value chain, incremental programmatic support will not be required.
 - *Nutritional sustainability.* MAP will introduce and modernise nutritionally-sensitive value chains for vegetables, fruits and root crops, all of which provide improved nutrition and reduce micronutrient deficiencies, combined with nutrition awareness raising. Once these value chains are well established at production and market levels, external intervention will no longer be required, also considering that many consumers are demanding food products with better nutritional characteristics.
 - *Technical sustainability.* Climate-smart technological solutions suitable for the Maldives, which overcome land/soil/water constraints and mitigate against climate change, are available globally. Once they are tested, adapted to local conditions, and successfully demonstrated, their sustainability is not perceived to be a risk.
 - *Environmental sustainability.* MAP investments are designed to be environmentally sustainable and climate-resilient across the board. Indeed, in many cases, the soil/water/chemicals-efficient production technologies to be introduced will replace current activities that are ecologically unsustainable and damaging.



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Annex 11: Mainstreaming themes – Eligibility criteria checklist

Mission Dates: 12 - 29 November 2019

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Project No. 2000002416

Report No. 0000

Asia and the Pacific Division
Programme Management Department

Mainstreaming themes – Eligibility criteria checklist

	<input checked="" type="checkbox"/> Gender transformational	<input type="checkbox"/> Youth sensitive	<input checked="" type="checkbox"/> Nutrition sensitive	<input checked="" type="checkbox"/> Climate finance
Situation analysis	<input checked="" type="checkbox"/> National gender policies, strategies and actors <input checked="" type="checkbox"/> Gender roles and exclusion/discrimination <input checked="" type="checkbox"/> Key livelihood problems and opportunities, by gender <input checked="" type="checkbox"/> Use (pro-WEAI) assessment for M&E baseline	<input type="checkbox"/> National youth policies, strategies and actors <input type="checkbox"/> Main youth groups <input type="checkbox"/> Challenges and opportunities by youth group	<input checked="" type="checkbox"/> National nutrition policies, strategies and actors <input checked="" type="checkbox"/> Key nutrition problems and underlying causes, by group <input checked="" type="checkbox"/> Nutritionally vulnerable beneficiaries, by group	
Theory of change	<input checked="" type="checkbox"/> Gender policy objectives (empowerment, voice, workload) <input checked="" type="checkbox"/> Gender transformative pathways <input checked="" type="checkbox"/> Policy engagement on GEWE	<input checked="" type="checkbox"/> Pathways to youth socioeconomic empowerment <input checked="" type="checkbox"/> Youth employment included in project objectives/activities	<input checked="" type="checkbox"/> Nutrition pathways <input checked="" type="checkbox"/> Causal linkage between problems, outcomes and impacts	
Logframe indicators	<input checked="" type="checkbox"/> Outreach disaggregated by gender <input checked="" type="checkbox"/> Women are > 40% of outreach beneficiaries <ul style="list-style-type: none"> • Pro-WEAI indicator 	<input checked="" type="checkbox"/> Outreach disaggregated by age	<input checked="" type="checkbox"/> Outreach disaggregated by gender <ul style="list-style-type: none"> • Further details to be confirmed 	
Human and financial resources	<input checked="" type="checkbox"/> Staff with gender TORs <input checked="" type="checkbox"/> Funds for gender activities <input checked="" type="checkbox"/> Funds for Pro-WEAI surveys in M&E budget	<input type="checkbox"/> Staff with youth TORs <input type="checkbox"/> Funds for youth activities	<input checked="" type="checkbox"/> Staff or partner with nutrition TORs <input checked="" type="checkbox"/> Funds for nutrition activities	IFAD Adaptation Finance \$3,264,000 IFAD Mitigation Finance N/A Total IFAD Climate-focused Finance \$3,264,000

ECG Remarks	<p>Gender The Project satisfies all the criteria to be gender transformative. The Theory of Change and Situational Analysis are robust with detailed pathways and funds allocated to produce gender transformative outcomes.</p> <p>Nutrition The Project meets all the criteria to be a nutrition sensitive project with a potential to produce nutritional outcomes for target groups. The Project has also allocated the necessary funds and human resources to address the nutritional challenges in the project areas.</p> <p>Youth The Project does not meet all the criteria to qualify as a youth sensitive project.</p> <p><input type="checkbox"/> No social inclusion themes</p>
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