

بِسْمِ اللّٰهِ الرَّحْمٰنِ الرَّحِیْمِ

Ministry of Agriculture and Animal Welfare

Male', Republic of Maldives



Ministry of Agriculture and Animal Welfare

Terms of Reference for Consultancy Service

for

Developing Water and Land Use Plan

Ref No: MAP/CS/2024/002

Submission date: 26th May 2025

Foreword

These terms of reference have been prepared by Project Implementation Unit of Ministry of Agriculture and Animal Welfare and are based on the 1st edition of the IFAD-issued standard procurement documents template for terms of reference available at www.ifad.org/project-procurement This document is to be used for the procurement of services in projects financed by IFAD.

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Terms of Reference (TOR)

Consultancy Service for Developing Water and Land Use Plan

1. Client

The client for this assignment is the Project Implementation Unit (PIU) of the Maldives Agribusiness Programme (MAP) under Ministry of Agriculture and Animal Welfare (MoAAW).

2. Country background

In the Maldives, basic agricultural information concerning land utilization, area planted, crop production and yield statistics, market information and livestock numbers, production, etc. is lacking. This lack of reliable agricultural statistics has made planning, policy analysis, and formulation of development projects very difficult for the Ministry, NGOs, and donor agencies.

Agriculture makes a considerable contribution to the rural economies and sustainability of rural livelihood. Although Agriculture only contributes to 1.2 % of the GDP and the contribution to the rural community is immense with the provision of food security. It has created a good market chain from the households to the island, atolls, and to the capital.

By 2021 there were 7,100 farmers registered with MoAAW. Most commonly local produce traded in Male' market includes coconut, banana, papaya and cucumber (SYB, 2020). However, farmers and the agriculture sector as a whole face many challenges in carrying out farming across the country.

Farmers lack the necessary technical skills to carry out sustainable agriculture and progress to value added-production. There is lack of appropriate infrastructure for agricultural value chains (such as appropriate irrigation, storage, transportation, market, etc.), and lack of farmers' organizations and opportunities for women to lead agricultural productivity. The government's Strategic Action Plan (SAP 2019-2023) addresses these challenges and aims to achieve the targets set out in the SAP through several policy interventions.

Land and water used plans for islands mentioned are participating in MAP field activities and lacking detailed information on water availability and water extractions use policy/rules. This is particularly critical for HOUSEHOLD use, agriculture, fisheries, natural vegetation protecting the shore and biodiversity of islands. It is therefore necessary to undertake island study to examine the capacity of the water lens, safe level of water extraction related to the level of recharge, vertical upheaval of saltwater and horizontal intrusion for project island not having such information

3. Background on project

The Government of Maldives (GoM) through MoAAW is jointly implementing the Maldives Agribusiness Programme (MAP) with financing from the International Fund for Agricultural Development (IFAD). The PIU set-up within the MoAAW Implements MAP in accordance with the guidelines provided by the project design report, project implementation manual of MAP, and with the guidance of the project steering committee and IFAD supervision missions.

The main aim of MAP is to enable small farmers in the Program area to sustainably enhance their production levels, increase income, secure food and nutrition for their household demands and deliver produce to connected markets.

MAP will be implemented nationwide, covering all regional and sub-regional hubs, clusters and islands, where agriculture is undertaken by small farmers. The main hubs for Programme activities are in region 1-3 including Haa Alif Hoarafushi for region 1. Haa Dhaalu Vaikaradhoo for region 2, and Shaviyani Milandhoo for region 3. Each of these hubs will serve eight (8), nine (9) and nine (9) inhabited agriculture islands respectively.

4. Background of the assignment

Groundwater, alongside rainfall, constitutes one of the primary sources of freshwater in the Maldives. It is distributed beneath each island in what hydrologists refer to as lenses—curved layers of freshwater floating atop denser saltwater. However, these groundwater reservoirs face multifaceted threats, including erratic future rainfall patterns, population growth, escalating pumping demands, rising sea levels, and contamination from surface pollutants. In addition, increasing temperatures exacerbate evaporation rates, diminishing the volume of rainwater available for infiltration into aquifers.

The extraction rate from aquifers has surged significantly, in areas where aquifers are shallow, such as along the island ridges. This escalating demand strains water sources, heightening the risk of saline water intrusion, imperiling agricultural lands. The intensifying requirements of agriculture necessitate meticulous planning to ensure sustainable water resource management.

The MAP initiative is committed to conserving and sustainably managing natural resources while promoting climate resilient agriculture farming practices. The project currently has established 5 demo sites of Green Houses (by introducing climate smart technologies like drip irrigation, hydroponics etc) as an alternative to open area farming. The number of Green Houses is expected to increase in all the intended project sites during the adoption phase, while also escalating the demand for water. Hence, the program emphasizes the importance of evaluating water lens status and formulating comprehensive water and land use plans to pinpoint suitable intervention areas.

To this end, delineated responsibilities entail engaging a proficient firm to conduct water and land use assessments and develop a comprehensive water management plan along with a framework for continuous monitoring. This plan aims to provide guidance to MAP and pertinent governmental initiatives in identifying optimal sites and activities for sustainable groundwater utilization. By fostering the development of a Water Lens Plan,

communities can bolster their capacity to harness natural resources sustainably, thereby safeguarding livelihoods and fostering biodiversity conservation.

5. Overall objective

The overarching aim of this study is to evaluate the status and availability of groundwater and land use trends/ patterns across three islands in the Northern Atolls (HA, HDh, and Sh); and formulate a comprehensive water and land use plan geared towards enhancing sustainable agricultural practices.

6. Objectives of the assignment

- A comprehensive Water and Land Use plan for 14 (refer annex) islands should be developed in close coordination and collaboration with technical team of MOAAW.
- Assess the current status of groundwater and prevailing land use practices.
- Conduct water level testing in potential sites in close coordination with Island Councils (follow a random sampling approach in identifying islands and sites)
- Evaluate the trends and potential scenarios of groundwater utilization, accounting for climate change impacts and heightened demand stemming from population growth and intensified agricultural activities.
- Develop GIS maps delineating the current status, trends, and potential scenarios of groundwater resources.
- Determine monthly safe extraction levels throughout the year from the given water lens, extrapolate data for application on similar islands, and produce maps delineating areas suitable and unsuitable for water extraction, highlighting the necessity for infiltration galleries.
- Contribute to identification of potential risks (including potential reluctance and resistance among beneficiaries) and devise corresponding mitigation measures.
- Prepare a comprehensive and actionable water and land use plan grounded in scientific analysis and participatory input, supplemented by field verification.
- Present the study findings to the MAP, government agencies, and stakeholders.
- Engage in consultations with smallholder farmers, government line agencies, and non-governmental organizations involved in water and land use to gather insights into existing issues and potential solutions.
- Develop a framework for regular and continuous monitoring.
- Ensure participatory consultation processes throughout the study to incorporate diverse perspectives and promote stakeholder engagement.

7. Methodology

The study will utilize both primary and secondary sources of information. Primary data will be gathered through interactions with households, communities, stakeholders, and government line agencies. Additionally, results from water level testing will be assessed. Secondary data will be obtained from existing land use plans and related documents. Below are some key considerations while conducting the study:

7.1. Water and Land use must be planned for 14 islands with the focus on conservation of soil, water, and other land resources and new technology of land use.

7.2. The consultancy service should include:

7.2.1. Assessment and documentation of current water and land use practices within the three islands and their relative significance:

- This will be done in a process involving meetings with island council members, with Agriculture Division members meetings, and field visits etc.;
- Assess the current water and land use plans of the islands.

Conduct water level testing at potential sites in close coordination with Island Councils, employing a random sampling approach to identify islands and sites.

7.2.2. Identify and document sustainable water and land use practices that promote:

- Sustainable use of water resources
- Achieve effective operational efficiencies and cost effectiveness
- Create a suitable environment that supports range of agricultural research, demonstration and extension methodologies
- Anticipate the trend of local demand, emerging technologies and evolving agriculture practices and research methodologies
- Island livelihoods and cultural heritage;
- Biodiversity conservation;
- Reduced land use conflicts;
- Climate change adaptation strategies;
- Sustainable agriculture;

8. Scope and limitation of work

8.1. Review previous studies on water lens in Maldivian islands.

8.2. Site visits to 14 island for proper understanding of the site, its boundary, and other features that would have planning implications. The service provider shall carry out thorough data collection and do their own analysis of the area.

8.3. Water from both HOUSEHOLD wells (14) and agricultural wells (14) should be sampled and tested for Water Quality testing parameters; Turbidity, electrical conductivity, PH, dissolved oxygen, Water Temperature, Color, Odor, Conductivity, pH, Acidity, Alkalinity, Total Dissolved Solids (TDS), Dissolved, Oxygen (DO), Biological Oxygen Demands (BOD), Chemical Oxygen Demand (COD), Total Phosphorous, Total Nitrogen, Chloride, Nitrate, Nitrite, Sulphate, Sodium, Magnesium, Calcium, Iron, Potassium, Ammonium, Total Fecal Coliform. A good sample should be taken, and records shared with the reports.

8.4. Undertake groundwater survey using restrictive electrical resistivity instrument and ground conductivity.

- 8.5. Undertake UAV mapping of islands using real-time kinematic accuracy with ground points. Supplement the UAV with topographic map and geographical parameters.
- 8.6. Sufficient samples to establish soil permeability.
- 8.7. Conduct well yield test at strategic locations at the islands.
- 8.8. Under social survey if not available to quantify water use for HOUSEHOLD, agriculture, fisheries, tourism and other economic activities existing on the islands. Also establish if the island expires flooding, if flooding how deep, how often and cause to the flooding. Establish potential flood zones of the island.
- 8.9. Estimate rate of lens water discharge and recharge on a monthly basis across the year.

Estimate lens water yield and maximum water extraction monthly across the year.

- 8.10. Using GIS and CAD delineate areas where water cannot be extracted
- 8.11. Provide recommendation if infiltration galleries are need on island both for better infiltration and minimizing flood water.
- 8.12. With use of appropriated statistical analysis extrapolation of finding between islands with similar configuration will be determined

9. Expected Deliverables

- 9.1. The deliverables will include;
 - 9.1.1. Draft report for review and inputs: Analyze all collected data and present the first findings to the PIU team for discussion and identification of gaps. If needed collect additional data for finalization of the analysis
 - 9.1.2. Final report: The report will contain clear recommendations on monthly safe levels of water extraction across the year, extrapolation of data for use in similar islands, map showing areas where water can and cannot be extracted and the need for infiltration galleries. Including a framework for regular and continuous monitoring.
- 9.2. Soft copies of high-quality GIS maps: Prepare all necessary drawing, scheme and map for the islands which will designate land areas for distinct uses based on the analysis so as to sustainably use the natural resources to secure their livelihoods while promoting biodiversity conservation.
- 9.3. Data sets generated from the study, and
- 9.4. Presentation of results to MAP and government agencies, and in related forum as needed

10. Reports and schedule of deliverables

Edit table below as required:

SN	Activities	Month I				Month II				Month III			
		w1	w2	w3	w4	w1	w2	w3	w4	w1	w2	w3	w4
1	Inception report												
2	Literature review												
3	Finalize survey instrument												
4	Data collection												
5	Community consultation												
6	Data analysis												
7	Report writing												
8	First draft report												
9	Second draft report												
10	Finding presentation												
11	Final report												
12	Report sharing												

[The points below appear repetitive. Please decide whether to keep or remove them. Some points could be listed as the contents of report above.]

- 10.1. Inception report with process guide (detailed Methodology) and plan template and clear timelines.
- 10.2. Finalization and agreeing list of stakeholders and primary research tools.
- 10.3. Questionnaire for need assessment and FGDs
- 10.4. Community and stakeholder engagement report
- 10.5. Draft water lens and land use plan and incorporating all comments and recommendations from PIU, and MoAAW. The report should include:
 - 10.5.1 Groundwater survey using restrictive electrical resistivity instrument and ground conductivity.
 - 10.5.2 UAV mapping of islands using real-time kinematic accuracy with ground points. Supplement the UAV with topographic map and geographical parameters.
 - 10.5.3 Sufficient samples to establish soil permeability and generate reports
 - 10.5.4 Conduct well yield test at strategic locations at the islands.
 - 10.5.5 Under social survey if not available to quantify water use for HOUSEHOLD, agriculture, fisheries, tourism and other economic activities existing on the islands. Also establish if the island expires flooding, if flooding how deep, how often and cause to the flooding. Establish potential flood zones of the island

10.5.6 Estimate rate of lens water discharge and recharge on a monthly basis across the year.

10.5.7 GIS and CAD delineate areas where water cannot be extracted

10.5.8 Provide recommendation if infiltration galleries are need on island both for better infiltration and minimizing flood water.

10.5.9 statistical analysis extrapolation of finding between islands with similar configuration will be determined

10.6. Final water lens and land use plan including all drawings, recommendations, and maps

11. Consultant's qualifications and experience

Key expert 1: Team leader

Qualifications, skills and Experience

- Master's Degree in the field of Regional Planning, Environmental Planning, Agriculture Extension/ Agronomy, water and land-use Planning/ land use management or similar field.
- At least 10 years of relevant professional work experience in Land use planning and Environment;
- Demonstrated evidence of the ability to develop GIS based Land Use Plans

Specific professional experience

- Demonstrated ability to work in partnerships with state agencies, manage and coordinate the work process
- The consultant shall have excellent planning, analytical, report writing and communication skills, and excellent knowledge of English and Divehi
- Familiar with island -based natural resource management and social land management
- Ability to take initiative and to work independently – as well as – part of a team;
- Excellent communication skills
- Excellent report writing, computer, and analytical skills
- Capacity to organize and facilitate senior-level consultative meetings
- Good understanding of international policies and agreements related to sustainable land management

Key expert 2: One engineer/ water hydrologist who double up as team leader

Qualifications, skills and Experience

- Postgraduate degree in engineer/water hydrologist or similar field
- Professional experience of at least 10 years

Specific professional experience

- Experience in undertaking water lens and Land Use Planning studies/work including sound knowledge of planning system including methods, tools, case examples
- Experience in conducting training and organizing workshops, stakeholder dialogue
- Good understanding of international policies and agreements related to sustainable land management
- Experience on Agriculture Extension

Key expert 3: One assistant engineer/hydrologist

Qualifications, skills and Experience

- Postgraduate degree in engineer/water hydrologist or similar field
- Professional experience of at least 3-5 years

Specific professional experience

- Preferable experience in undertaking water lens and Land Use Planning studies/work including sound knowledge of planning system including methods, tools, case examples
- Experience in conducting training and organizing workshops, stakeholder dialogue
- Good understanding of international policies and agreements related to sustainable land management
- Experience on Agriculture Extension

Key expert 4: Socio-economist

Qualifications, skills and Experience

- Postgraduate degree in economics, finance, statistic or similar field
- Professional experience of at least 5 years

Specific professional experience

- Preferable experience in financial and economic analyses, data analyses and experience on data collection
- Experience in conducting training and organizing workshops, stakeholder dialogue
- Good understanding of international policies and agreements related to sustainable land management
- Experience on Agriculture Extension

Key expert 5: Two land surveyor

Qualifications, skills and Experience

- Postgraduate degree in engineering, geodesist and surveyor
- Professional experience of at least 5 years

Specific professional experience

- Preferable experience in conducting land surveyor
- Experience in conducting training and organizing workshops, stakeholder dialogue
- Good understanding of international policies and agreements related to sustainable land management
- Experience on Agriculture Extension

Please include a table with team members engagement (day/activity)

[Information in section 12 is mentioned above, please decide whether to keep or remove them]

12. Location and period of execution

- 12.1. Study will be conducted for the HAC of MoAAW
- 12.2. Expected duration of this assignment is up to 90 working days after signing the contract and conducting an inspection workshop

13. Project coordination

- 13.1. Consultant shall operate under the overall guidance and supervision of the Project Director, with technical guidance and support from the Chief Technical Advisor of the project, operational support and direct supervision from the PIU, technical guidance from IFAD, in close collaboration with MoAAW and in consultation with the relevant national stakeholders.

14. Services and facilities to be provided by client

- 14.1. Full cooperation in facilitating the Services
- 14.2. Assistance in provision of any letters or other documents required for obtaining Visa and/or Work Permits necessary for expatriate members of the Consultancy Team.
- 14.3. Available relevant data and information requested by the Consultant regarding existing infrastructure at the Works site deemed to be useful for planning and carrying out the Services.