CONTENTS

INTRODUCTION

This project will implement Integrated Water Resources Management (IWRM) systems on the densely populated islands of Haa Alif Ihavandhoo, Alif Dhaalu Mahibadhoo and Gaafu Dhaalu Gadhdhoo. Financial support for the project came from the Adaptation Fund under the United Nations Framework Convention on Climate Change (UNFCCC). The project will be implemented jointly by the Government, UNDP and the United Nations Office for Project Services (UNOPS).

Water is scarce in the islands due to climate change-linked decline of freshwater resources, and inhabited islands in the country often do not have a functioning water supply and distribution network that can ensure sufficient supply of safe freshwater during dry periods.

The project will ensure that measures responding to climate change-related risks such as greater rainfall variability, unreliable recharge of aquifers, longer dry periods, and increasing damage to infrastructure from extreme weather events, are addressed in concert with the response to basic development problems.

The project will provide a compound solution to a number of critical climate and non-climate-related problems, and will be a suitable model for replication on other islands with similar vulnerabilities. The project aims to pave the way for the enforcement of climate resilient freshwater management systems on all inhabited islands in the country.

Project Design

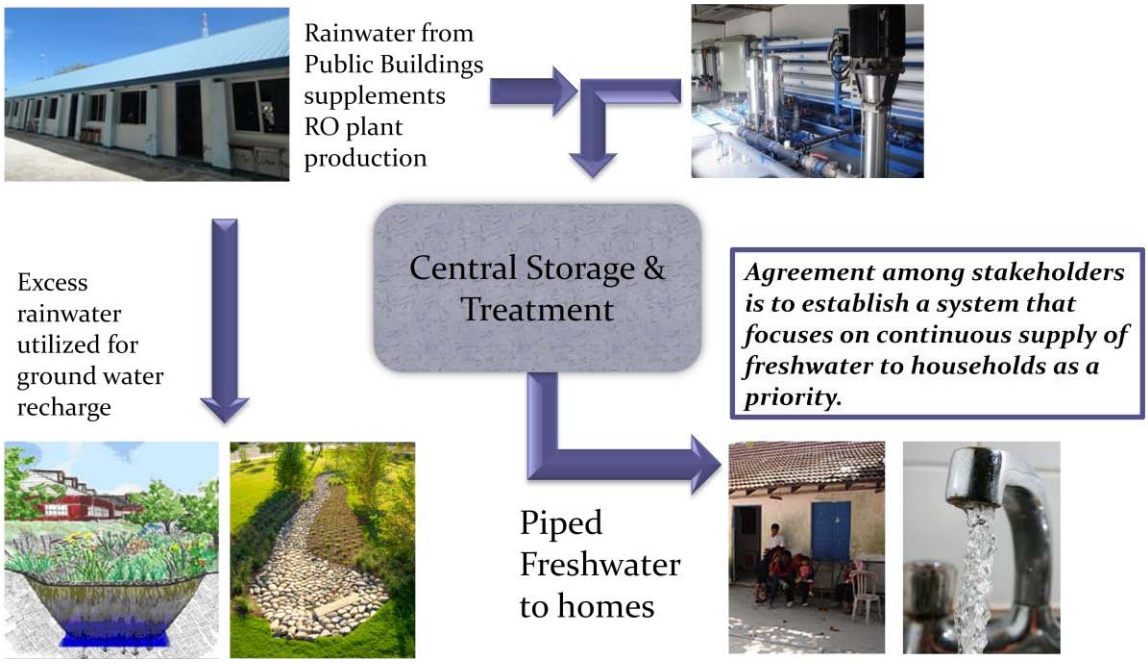
The primary problem addressed by this project is a significant, climate change-induced decline of freshwater security that is affecting vulnerable communities in Maldives. As surface freshwater is generally lacking throughout the country, the key problems pertaining to freshwater security relate to the management of increasingly saline groundwater and increasingly variable rainwater resources. In order to reduce the aforementioned barriers to effective climate change adaptation in the water management sector, it is essential to reinforce the perspective of Integrated Water Resources Management (IWRM).This will ensure that measures responding to additional, climate change-related risks (such as greater rainfall variability, unreliable recharge of aquifers, longer dry periods, and increasing damage to infrastructure from extreme weather events) are addressed hand in hand with a response to basic development problems (such as insufficient sewage and wastewater treatment, lack of environmental awareness, lack of water conservation, and lack of comprehensive stakeholder participation in the design and monitoring of water management schemes).

Through the rollout of an integrated water resource management programme in Haa Alif Ihavandhoo, Alif Dhaalu Mahibadhoo and Gaafu Dhaalu Gadhdhoo, the project will ensure consistent, safe and equitable access of all island communities to safe freshwater in a changing climate. Through a targeted mix of the following investments, the project will address the effects of variable rainfall, extreme weather events, salinization and pollution of aquifers:

- ☐ Establishment of a sustainable freshwater supply system that incorporates desalination and rainwater harvesting technology
- ☐ Establishment of a sustainable groundwater management system that incorporates groundwater recharge and wastewater management technology

- ☐ Increasing community participation in the development, allocation and monitoring of freshwater use in a changing climate
- ☐ Replication and up scaling of climate-resilient freshwater management

Components of Integrated Water Resources Management



Project Goal, Outcomes and Budget

GOAL:

Ensure reliable and safe freshwater supply for Maldivian Communities in a changing climate.

Outcome	Amount
1. Ground water aquifer rehabilitated and freshwater supply ensured in HA. Ihavandhoo, ADh. Mahibadhoo and GDh. Gadhdhoo to provide reliable, equitable and cost-effective access to safe freshwater in a changing climate (implemented by UNOPS)	7,320,398
2. Strengthened local awareness and ownership of integrated, climate-resilient freshwater management	110,000
3. Improved institutional capacity to promote and enforce climate-resilient freshwater management on all inhabited islands	80,000
4. PMU (US$ 660,602) and Monitoring & Evaluation (US$ 114,000) + Fee by IE (US$ $704,225)	1,478,827
Total Adaptation Fund	**8,989,225**

Inception Phase Status

The inception phase from January – June 2012 included the following activities:

- ☐ Discussions and agreement between the Implementing Partner, the Ministry of Environment and Energy and the Executing Agency UNDP on the use of existing project management personnel to reduce costs to the project.
- ☐ In April, 3 staff were appointed to the project: Project Manager, Finance Officer and the Knowledge Management and Administration Officer.
- ☐ The recruitment process of the Technical Officer of the Project was initiated.
- ☐ A project initiation seminar for stakeholders was held on 25 April 2012. Representatives from the Atoll Councils of Haa Alif Atoll, Alif Dhaalu Atoll and Gaafu Dhaalu Atoll and Island Council representatives from Mahibadhoo and Gadhdhoo joined the discussions along with representatives of utility companies and government institutions.
- ☐ Technical surveys were undertaken to Haa Alif Ihavandhoo, Alif Dhaalu Mahibadhoo and Gaafu Dhaalu Gadhdhoo by UNOPS during May and June 2012.
- ☐ Community consultations were held on Haa Alif Ihavandhoo, Alif Dhaalu Mahibadhoo and Gaafu Dhaalu Gadhdhoo islands in June and July 2012.
- ☐ An inception workshop and follow-up meeting to the inception workshop was held on 20 June and 26 June 2012 respectively.
- ☐ The Project Results Framework was updated, no major changes were made.
- ☐ The draft technical concept design was discussed and feedback from the Island Councilors, Atoll Councilors, utility companies, and government institutions was.
- ☐ The Project Management and Governance arrangements were discussed and agreed to.
- ☐ The Annual Work Plan was reviewed, revised and agreed to.

RECOMMENDATIONS FOR PROJECT DESIGN AND IMPLEMENTATION

COMPONENT 1: Establishment of integrated, climate-resilient water supply and –management systems in Mahibadhoo, Ihavandhoo and Gadhdhoo

- ☐ Provide the technical basis for selecting capacities for designs proposed e.g. what determines the capacity for a storage tank.
- ☐ The designs proposed should take into account rainfall data and projections. Note high intensity incidences (50mm and above of rainfall) are very few and happen only once or twice a year.
- ☐ Present a variety of engineering options in light of varying situations in the three islands. The design engineers must physically visit the islands during the detailed designing phase.
- ☐ Provide technical and managerial training for operation and maintenance. Allow the community to select the option based on their willingness to pay.
- ☐ Charge tariffs from the start of the system. Involve the utility company from the start of the project.
- ☐ Ensure the system is financially feasible.
- ☐ Balance work package distribution with manpower available for supervision of contractors and costs.
- ☐ Small contracts to island communities may not result in cost effectiveness. Explore past experiences.
- ☐ Community feedback: A sophisticated system is not necessary. A system that works, is affordable and sustainable.

Output 1.1: Artificial groundwater recharge systems established to protect groundwater resources from salinization and improve aquifer yields in dry seasons

- ☐ Learn from experiences e.g. Male' where roadside drainage mechanisms have not worked. Introduce new innovative green options that have proven to work where excess runoff does not create flooding or gets diverted to the sea.
- ☐ Take future developments into account.

Output 1.2: Existing rainwater harvesting schemes are redesigned, interconnected and structurally improved to buffer climatic extremes and ensure equal water supply for all households during dry periods

- ☐ Base calculations of community water tanks on available catchment area of public roofs and rainfall intensity. Include maintenance mechanisms to ensure sustainability beyond the lifecycle of the project.
- ☐ Ensure rainwater is treated before entering the distribution network.
- ☐ Take into consideration the regular operation requirements of plants when project interventions for rainwater harvesting in households and community storage tanks are decided upon.

☐ Alternatives to UV lap and filters for disinfection at household level to be explored. As these are expensive to replace.

Output 1.3: Production and distribution system for desalinated water supply established

☐ Design capacities of reverse osmosis plants and storage tanks must consider the need for continuous operation. Note that these plants need to be continuously operated to avoid breakdown.

☐ Consider bore holes for intake. Beach wells are not sustainable.

☐ Explore newer technologies. Ensure that the international suppliers with a present in the Maldives are given preference.

☐ Designs for the RO plant should consider the capacities and possibilities of expansion in the future without over designing and reduce the operational costs by incorporating rainwater harvesting.

☐ Energy Efficiency through energy recovery, solar integration and rainwater harvesting.

☐ Stringent operational standards to minimize waste.

☐ Incorporate preventive maintenance to optimize output efficiency.

☐ Plan for continuous service through contingency planning and mitigating operational risks.

☐ Include a mechanical engineer to supervise.

☐ Connections to be provided to all registered households.

☐ Consider existing networks such as sewerage, electricity distribution and communication. Consult with stakeholders to avoid disruption to other services.

Output 1.4: Existing wastewater management systems redesigned and improved to ensure sufficient quantities of safe groundwater

☐ Make sure that this output is addressed in the IWRM system.

☐ Provide tertiary treatment to waste water and ground infiltration.

☐ Take future developments into account.

COMPONENT 2: Increase participation in the development, allocation and monitoring of freshwater use in a changing climate

☐ Address risk of political influence and the provision of a free service by increasing awareness on costs of operation and maintenance.

☐ Address risk of Reverse Osmosis plants being used only in dry periods by increasing awareness on how these systems operate.

☐ Put in place a mechanism to address risks on those that default on their bills.

Output 2.1.: Community consultations on each target island ensure participative design, sustainability and continued maintenance of integrated water resource management schemes

- ☐ Communicate and include island communities throughout the project implementation.
- ☐ Carry out a willingness to pay survey.
- ☐ Share work schedules with the councils in advance.

Output 2.2.:Targeted training events conducted in each region to strengthen water user participation and skills in adaptive, integrated water resource management

- ☐ Include students and teachers in the target groups. Verification of awareness through a pre-campaign and post-campaign survey.

COMPONENT 3: Replication and up scaling of climate-resilient freshwater management

- ☐ The target is to replicate on at least four islands. Define these islands.
- ☐ Include the Environmental Protection Agency, Ministry of Environment and Energy and Atoll councils as sources of verification.

Output 3.1.: Training of technicians in the design, operation and management of integrated water resource management systems

- ☐ Address the limited capacity which can be used to train people in for example, the Ministry of Environment and Energy and the Maldives Water and Sewerage Company.

Output 3.2: Institutional mechanisms created to integrate adaptive management of freshwater resources into the design and rollout of new water management projects and schemes

Output 3.3.: Action plan developed and financing mobilized to replicate integrated, climate-resilient freshwater management on at least 4 additional islands

PROJECT RESULTS FRAMEWORK

There are no major changes to the project results framework. The changes agreed to are highlighted in the original project results framework presented below.

In summary the project is to ensure that all outputs as defined in the project document are adhered to during implementation such as the groundwater recharge mechanisms, greywater treatment for groundwater recharge and inclusion of renewable energy resources to reduce to the demand on conventional electricity generation facilities on the islands.

	Indicator	**Baseline**	**Target**	**Sources of verification**	**Risks and Assumptions**
Objective: To ensure reliable and safe freshwater supply for Maldivian communities in a changing climate	Number of Maldivians with safe and reliable freshwater supplying any extreme climatic condition	Accordingtothe2010MDGassessmentfor Maldives,14%of all Maldivians living outside the capital zone lack reliable access to an improved freshwater source and face water shortages during climatic extremes	Integrated water resource management systems on Ihavandhoo, Mahibadhoo and Gadhdhoo provide24% of all Maldivians who are vulnerable to water shortages and degrading water quality in a changing climate with a reliable supply of safe freshwater Replicationoftheprojecton4 additional islands provides at least 50% of all Maldivians who are exposed to water shortages and degrading water quality in a changing climate with a reliable supply of safe freshwater	MDG assessment Reports from water utilities and island councils Design and investment plans for freshwater supply and wastewater management schemes Field surveys	New island councils ensure continued operation and maintenance of integrated water management systems through water tariffs The GOM is successful in mobilizing additional public and private financing for project replication
Outcome 1: Ground water aquifer protected and freshwater supply ensured in HA. Ihavandhoo, ADh. Mahibadhoo and GDh. Gadhdhoo to provide reliable, equitable and cost-effective access to safe freshwater in a changing climate	Number of people living on HA. Ihavandhoo, ADh. Mahibadhoo, and GDh. Gadhdhoo who have uninterrupted access to reliable and safe freshwater supply in extreme climatic conditions	6701 people living on HA. Ihavandhoo, ADh. Mahibadhoo, and GDh. Gadhdhoo are not able to meet their freshwater needs in a highly variable and changing climate. Water needs are met through unreliable supply of rainwater, which is frequently contaminated through insufficiently protected collection and storage systems. Total freshwater collection and storage capacity on each island is insufficient to address water needs during the dry season. Groundwater is highly saline and polluted and unfit for domestic use. Backup desalination systems do not supply the minimum humanitarian water requirements during climatic extremes and	100% of the population living on HA. Ihavandhoo, ADh. Mahibadhoo, and GDh. Gadhdhoo will have uninterrupted access to reliable and safe freshwater supply of at least 20 liters per person per day at all times, including during extreme climate events	Reports from utility companies and island councils Field visits	Utility Companies and island communities successfully negotiate operation and maintenance schemes which sustain the provision of clean and safe freshwater

	Indicator	Baseline	Target	Sources of verification	Risks and Assumptions
		disaster events.			
Output 1.1: Artificial groundwater recharge systems established to protect groundwater resources from salinization and improve aquifer yields in dry seasons	Groundwater quality on each target island	Perception with target population of all islands that due to salinity and pollution, groundwater is unfit for consumption and most household uses. No current data available on the quality of groundwater in target islands Existing groundwater recharge capacity: Ihavandhoo: 0 m3 Mahibadhoo: 0 m3. Gadhdhoo:0 m3	By the end of the project, the quality of groundwater in each target island has improved to levels that are safe for hygiene and agricultural purposes Ihavandhoo: 700 groundwater recharge pits and 30 community recharge wells developed Gadhdhoo: 495 groundwater recharge pits and 30 community recharge wells developed; Mahibadhoo: 275 groundwater recharge pits and 30 community recharge wells developed	EPA technical tests of water quality Periodic water testing from utility companies and/or island communities Island council report at project competition	Island communities recognize the value of safe groundwater, participate in the regular monitoring of groundwater quality, and ensure proper maintenance of groundwater recharge systems
Output 1.2: Rainwater harvesting schemes redesigned, interconnected and structurally improved to buffer climatic extremes and ensure equal water supply for all households during dry periods	Volume of rainwater collected and stored to supply safe and clean freshwater during dry periods	Existing rainwater harvesting capacity: Ihavandhoo: 1,289m3 (households) + 105m3 (communal) Gadhdhoo: no data(individual systems only) Mahibadhoo: no data (individual systems only) Most existing rainwater harvesting systems have insufficient capacities of 2,5 m3 per household and lack proper disinfection safeguards	Improved rainwater harvesting and storage capacity will be installed as follows: Ihavandhoo:9,000 m3 Mahibadhoo: 6,300 m3. Gadhdhoo:6,300 m3 All new rainwater harvesting systems will be equipped with disinfection safeguards to ensure safety of water supply	Field visits Reports from utility companies and island councils	Island councils, community members and utility companies agree on preferred options of centralized vs. decentralized rainwater harvesting and allocate sufficient landform additional storage capacity
Output 1.3 Production and distribution system for desalinated water supply established	Capacity of desalinated freshwater supply available during dry spells,	Existing capacity to generate freshwater supply from desalination: Ihavandhoo: 0m3/day Gadhdhoo: 10m3/day	The following minimum amounts of desalination capacity will be installed on each target island: Ihavandhoo: 90 m3	Field visits Reports from island councils and utility companies	Utility companies and island communities monitor potable water quality at least twice per year and comply with their assigned responsibility for the

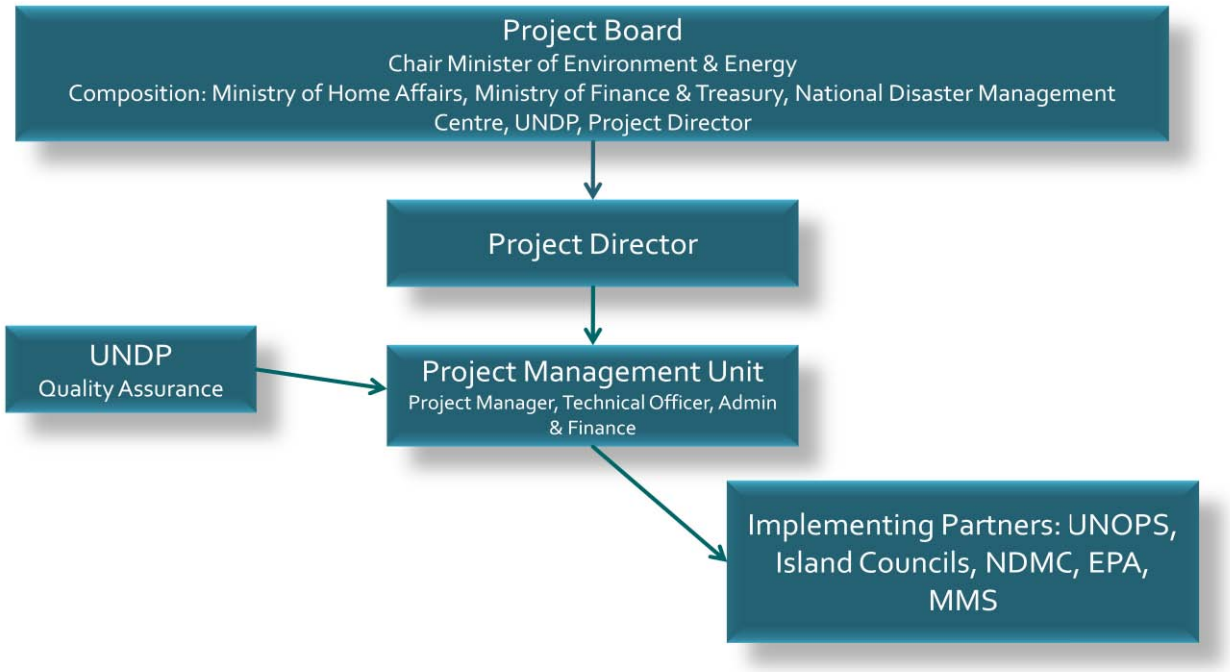
	Indicator	Baseline	Target	Sources of verification	Risks and Assumptions
	drought and flooding	Mahibadhoo: 10m3/day	Mahibadhoo: 60 m3. Gadhdhoo:60 m3 Potable water quality levels will be in conformity with WHO standard at all times		maintenance of desalinization systems
Output 1.4 Existing wastewater management systems redesigned and improved to ensure sufficient quantities of safe groundwater during dry periods **Ensure this component is incorporated in UNOPS design**	Number of planned wastewater management and sewage systems which integrate targeted measures to reduce groundwater pollution	1 sewage treatment plant under construction by a contractor in ADh. Mahibadhoo 1 sewage treatment plant in design phase in HA. Ihavandhoo; 1 sewage treatment plant in design phase in GDh. Gadhdhoo Sea level rise and unsecured septic tanks pollute groundwater and render it unsafe for household uses	All sewage and wastewater management systems which are planned and/or constructed on the 3 target islands integrate targeted measures to reduce groundwater pollution All septic tanks on each target island are cleaned at least twice per year to prevent groundwater pollution from flooding events	EPA technical assessments Sewage and wastewater management design plans prepared by utility companies Island council reports	MHE can ensure that contractors engaged under the current and planned wastewater management projects will integrate project findings into the design of new sewage and wastewater management projects Utility companies and island communities ensure proper maintenance and functioning of wastewater systems
Outcome 2: Strengthened local awareness and ownership of integrated, climate-resilient freshwater management systems	Number of integrated water management systems which are based on participatory planning between water users and water providers and can be sustained in line with actual willingness to pay for operation and maintenance	Willingness to pay for integrated water management services is unknown No participatory planning and design process for water supply and management schemes	Integrated water management systems on all target islands are designed and installed based on community participation, and their operation and maintenance is based on actual willingness to pay	Willingness to pay survey Reports from utility companies Infrastructure maintenance status at the end of the project	Operation and maintenance of IWRM systems can be sustained on the following basis: (Number of households) x (average cost value of willingness to pay) = total running cost of the IWRM system **WTP – political influence & provision of free service** **Might only be used**

	Indicator	Baseline	Target	Sources of verification	Risks and Assumptions
					in dry periods **What to do with those that default on their bills**
Output 2.1: Community consultations on each target island ensure participative design, sustainability and continued maintenance of integrated water resource management schemes **Involve nearby tourist resorts as part of their CSR**	Communal willingness to pay for continued operations and maintenance of freshwater supply on each target island	Willingness to pay for integrated water management services is unknown No participatory planning and design process for water supply and management schemes	Integrated water resources management systems on each target island are designed and installed on the basis of community input, and their continued operation is aligned with actual willingness to pay for the operation and maintenance of the installed infrastructure	Willingness to pay survey Reports from Island Councils and utility companies Observations from stakeholder consultations **Who is responsible**	Utility Companies and island communities successfully negotiate operation and maintenance schemes which sustain the provision of clean and safe freshwater (Number of households) x (average cost value of willingness to pay) = Total running cost of IWRM systems
Output 2.2: Targeted training events conducted in each region to strengthen water user participation and skills in adaptive, integrated water resource management	Number of Maldivians which are aware about their rights, roles and responsibilities in the management of freshwater resources in a changing climate	Limited awareness across all islands and atolls about the value of water as both an economic as well as social good, which is sensitive to climate-related shocks and stresses and therefore needs to be managed responsibly.	At least 1 IWRM training campaign is conducted in each administrative region (7 total) to strengthen dialogue between water users and providers and increase sensitization about the economic, social and environmental role of water in a changing climate **Include students and teachers**	Training protocols Attendance lists Training materials Feedback forms **How to verify that awareness has increased. Questionnaire**	Training materials from global IWRM projects can be adopted to support training purposes in Maldives
Outcome 3: Improved institutional capacity to promote and enforce climate-resilient freshwater management on all inhabited islands	Number of fully financed follow-up projects which adopt the climate resilient, integrated water resources management approach demonstrated by the project	Maldives has no integrated water resources management project in place that is suitable for replication and up scaling	Project approach is replicated on at least 4 islands --- **what are the four islands**	Design and investment plans **EPA, MEE & atoll councils**	The GoM is successful in mobilizing additional public and private financing for project replication

	Indicator	Baseline	Target	Sources of verification	Risks and Assumptions
Output 3.1: Training of technicians in the design, operation and management of Integrated Water Resource Management systems	Number of staff from water and sewage utility companies trained in the technical principles and skills required to design, implement and maintain climate- resilient and integrated water management systems	No staff of public or private utility companies in Maldives has received targeted training on IWRM **There is limited capacity which can be used to train additional people for e.g. MWSC or MEE**	At least 5 staff from each water and sewage utility company currently active in Maldives are trained in the technical principles of integrated water resource management and recognize basic design principles which make water supply and sewage systems adaptive to a changing climate	Training protocols Attendance lists Training materials Feedback forms	Utility companies recognize the value of the training and designate senior technical staff to participate
Output 3.2: Institutional mechanisms created to integrate adaptive management of freshwater resources into the design and rollout of new water management projects and schemes	Number of new water and sewage management projects which are reviewed and improved on the basis of lessons learned from the project	Maldives has no adaptive and integrated water resources management project in place that is suitable for replication and up scaling The government is not able to draw on best practices in the adaptive management of freshwater resources	Each new water and wastewater management project that is approved by the Government of Maldives is subject to technical reviews on the basis of IWRM and climate resilience principles	Design plans Expert reviews Government feedback Documented approvals of new projects	Lessons learned and design principles of the project are sufficiently codified to enable use by the Government in the approval and financing of new IWRM projects MHE establishes a systematic review process for new water management projects that integrates lessons learned from the
Output 3.3 Action plan developed and financing mobilized to replicate integrated, climate-resilient freshwater management on at least 4 additional islands	Financing allocated to new water management projects which integrate climate resilient and integrated design and are approved by the government for implementation	The government is not able to draw on best practices in the adaptive management of freshwater resources to enable systematic planning and financing of additional projects	The government approves at least 4 new, fully financed freshwater and/or wastewater management projects on the basis of lessons learned and design principles replicated from the proposed project	Design plans Documented financial commitments	Financing is mobilized from public and private sources to replicate the project in other sites

PROJECT MANAGEMENT & GOVERNANCE ARRANGEMENTS

The diagram below depicts the project management and governance arrangements for the project. The Project Board is expected to meet bi-annually and/or as needed. Due to the delay in the project's inception the Project Board is expected to meet at least twice in the latter half. The first board meeting will be an introductory meeting sharing the project's timeline for the remainder of 2012. A board meeting will be held at the start of the fourth quarter to endorse final technical designs for the project.



Project Board – Responsibilities

- **Approve key management decisions of the project and assure technical quality, financial transparency and overall development impact of the project.**
- Provide strategic guidance and direction to the project, ensuring it remains within any specified constraints of time, scope and budget;
- Provide advice and guidance on efficient and timely execution of the project, when required;
- Establish policies when required to define the functions, responsibilities, and delegation of powers for the implementing agencies and the Project Management Unit;
- Ensure that project's policy recommendations are integrated within the policies of respective sectors each member represents;
- Address project issues including approval of major project revisions;
- Provide guidance and agree on possible countermeasures/management actions to address major issues and risks;

- Ensure that AF resources are committed exclusively to activities that relate to achievement of the project objective;
- Resolve significant conflicts within the project, and negotiate a solution to major problems that may arise between the project and external bodies;
- Appraise the Project progress and make recommendations for next steps.

Board Composition &Representatives

1. Ministry of Environment and Energy
    - Mr. Abdul Matheen Mohamed – Minister of State for Environment and Energy (Chair)
    - Ms. Shaheeda Adam Ibrahim– Director General (Project Director)
2. Ministry of Finance and Treasury
    - Mr. Mohamed Ahmed – Financial Controller
    - Mr. Imad Mohamed – Director General
    - Ms. Aminath Nashia– Director
3. Ministry of Housing and Infrastructure
    - Mr. Abdulla Ziyaad– Minister of State for Housing and Infrastructure
4. Ministry of Home Affairs
    - Mr. Mohamed Fayaz – Minister of State for Home Affairs
    - Mr. Ahmed Shareef Nafees – Director General
    - Mr. Rilwan Adam – Project Officer
5. National Disaster Management Centre
    - Ms. Fathimath Thasneem – Deputy Minister
    - Mr. Hisan Hassan – Project Director
6. UNDP
    - Mr. Andrew Cox – Resident Representative

Responsibilities of the National Project Director

- **To execute project activities, including day-to-day operations of the project, and the overall operational and financial management and reporting.**
- Implement guidance from the National Project Director and Project Board,
- Lead the project team through the timely planning, implementation, and delivery of project Outputs and Outcomes as indicated in the Strategic Results Framework.
- Financial management and disbursements, with accountability to the government and UNDP.
- Closely work and network with the relevant government agencies, UNDP, UNOPS, the private sector, NGOs, and civil society organizations

Key Milestones: April-December 2012

Month	Activity
April	Official launch and consultative seminar
May	Field visits by UNOPS
June	Inception workshop and community consultations
July	Revised concept design submitted by UNOPS
August	Concept design approval. Discussion with community. Advertise for willingness to pay survey consultancy.
September	Detailed designs prepared. Work packages for tendering defined and approved. Willingness to pay survey underway.
October	Modifications to design based on willingness to pay survey. Preparation of tender documents.
	Project Board Meeting
November	Issue of tender documents
December	Contracts awarded.

Key Milestones: 2013-2015

Year	Activity
2013	Completion of community rainwater harvesting, distribution network and RO plant. Ground water recharge constructed and installed. Operation and maintenance training. Awareness campaign on target islands.
2014	Final testing ground water system. Presentation of project results. Interviews with local community. Awareness campaign for replication. Technical Support to Government. Official handover.
2015	Evaluation and Project close.

ANNUAL WORKPLAN 2012

United Nations Development Programme
Country: Maldives
Project Document

Project Title: Increasing climate resilience through an Integrated Water Resource Management Programme in HA. Ihavandhoo, ADh. Mahibadhoo and GDh. Gadhoo Isalnd

UNDAF Outcome(s):

OUTCOME 8: Communities have access to safe drinking water and adequate sanitation and Sustainably manage the natural environment to enhance their livelihoods

Expected CP Outcome(s):

Environmental services and protection measures accessed by more communities with greater participation of youth in planning and implementation

Expected Output(s):

- Empower local communities concerning sustainable operation and management of infrastructure, on waste management and water and sanitation installed during tsunami recovery; and progressively devolve key management responsibilities to pilot communities within a strategy agreed with community-based organizations, and particularly youth.
- National environmental policies/regulations/standards/guidelines on solid waste management, hazardous waste, water and sanitation, environmental health, land management, and coastal modification formulated to guide sectoral policies, programmes.

Implementing Partner: Ministry of Environment and Energy

Responsible Parties: UNDP Maldives

Brief Description

For projects within a CPAP, the narrative section is limited to this box as it is assumed that more detailed information shall be found in the approved CPAP. However, additional sections can be inserted as required within the template.

The primary problem addressed by this project is a significant, climate change-induced decline of freshwater security that is affecting vulnerable communities in Maldives. As surface freshwater is generally lacking throughout the country, the key problems pertaining to long-term freshwater security relate to the management of increasingly variable rainwater resources and increasingly saline and polluted groundwater. The proposed project will demonstrate climate-smart freshwater management in the Maldivian context and establish integrated and resilient water supply systems on the densely populated islands of HA. Ihavandhoo, ADh. Mahibadhoo and GDh. Gadhdhoo, with a view on country- wide replication and up scaling. The project will increase total freshwater storage capacity on all target ' islands to buffer the effects of less reliable rainfall and freshwater shortages during longer dry periods, and improve the quality of harvested rainwater through adjustments in rainwater collection, filtration and storage. The robustness and connectivity of communal rainwater storage schemes will be strengthened, and additional production capacity for desalinated freshwater will be installed to provide backup capacity in times of water stress. Artificial groundwater recharge will be enhanced to improve the quality and quantity of water stored in the natural aquifer, and contamination of household effluents will be reduced to prevent damages to the sensitive reef ecosystem. In their integration, these elements provide a compound solution to a number of critical climate and non-climate-related problems and a suitable model for replication on other islands with similar vulnerabilities. Experiences from this project will be so used to inform capacity development of public and private sector stakeholders at national, provincial, atoll and island level.

Programme Period:	2011 - 2015
Key Result Area (Strategic Plan):	
Atlas Award ID:	00061753
Start date: End Date	November 2011 October 2011
PAC Meeting Date	
Management Arrangements	NEX

2012 YYYY AWP budget:	780,200.00 USD
Total resources required	
Total allocated resources:	10,085,000 USD
• Regular	
• Other:	
o AF	8,285,000 USD
o Donor	
o Donor	
o Government(in Kind)	1,800,000 USD
Unfunded budget:	
In-kind Contributions	

Agreed by (Implementing Partner): ABDULLAHI MAJEED, DEPUTY MINISTER

Agreed by UNDP: UNDP RR 18/7/12.

18/7/2012

INKind

EXPECTED OUTPUTS	PLANNED ACTIVITIES	TIMEFRAME				RESPONSIBLE PARTY	PLANNED BUDGET		
And baseline, associated indicators and annual targets	*List activity results and associated actions*	Q1	Q2	Q3	Q4		Funding Source	Budget Description	Amount (USD)
Output 1.1:									**55,000.00**
Artificial groundwater recharge systems established to protect groundwater resources from salinization and improve aquifer yields in dry seasons. ***Indicator:*** *Ground water Quality on each target islands.*	1.1.1 Data Collection, Meetings, Field Visits, Topo Survey & Soil Investigation		X			UNOPS	AF	Travel - USD 5,000. IT Equipment – USD 500. Office operations and utilities – USD 1,500. Local Consultants – USD 2,000. Intl Consultants – USD 1,000.	10,000.00
	1.1.2 Designing of Technical designs, BOQs and bid document.		X	X		UNOPS	AF	IT Equipment – USD 2,000. Office operations and utilities – USD 3,000. Local Consultants – USD 8,000. Intl Consultants – USD 2,000.	15,000.00
	1.1.3. Bidding process and awarding of contracts			X		UNOPS	AF	IT Equipment – USD 500. Office operations and utilities – USD 1,500. Local Consultants – USD 2,000. Intl Consultants – USD 1,000.	5,000.00
	1.1.4 Implementation and monitoring				X	UNOPS	AF	Contractual Services – USD 15,000. Materials & Goods – USD 10,000.	25,000.00
Output 1.2:									**230,000.00**
Rainwater harvesting schemes redesigned, interconnected and structurally improved to buffer climatic extremes and ensure equal water supply for all households during dry periods. ***Indicator:*** *Volume of rainwater collected and stored to supply safe and clean freshwater during dry periods.*	1.2.1 Data Collection, Meetings, Field Visits, Topo Survey & Soil Investigation		X			UNOPS	AF	Travel - USD 5,000. IT Equipment – USD 500. Office operations and utilities – USD 1,500. Local Consultants – USD 2,000. Intl Consultants – USD 1,000.	10,000.00
	1.2.2 Designing of Technical designs, BOQs and bid document.		X	X		UNOPS	AF	IT Equipment – USD 2,000. Office operations and utilities – USD 3,000. Local Consultants – USD 8,000. Intl Consultants – USD 2,000.	15,000.00
	1.2.3. Bidding process and awarding of contracts			X		UNOPS	AF	IT Equipment- USD 500. Office operations and utilities – USD 1,500. Local Consultants – USD 2,000. Intl Consultants – USD 1,000.	5,000.00
	1.2.4 Supply of materials for RWH				X	UNOPS	AF	Materials & Goods – USD 100,000.	100,000.00
	1.2.5 Installing Community RWH systems				X	UNOPS	AF	Contractual Services – USD 25,000. Materials & Goods – USD 75,000.	100,000.00

EXPECTED OUTPUTS	PLANNED ACTIVITIES	TIMEFRAME				RESPONSIBLE PARTY	PLANNED BUDGET		
And baseline, associated indicators and annual targets	*List activity results and associated actions*	Q1	Q2	Q3	Q4		Funding Source	Budget Description	Amount (USD)
Output 1.3:									**300,000.00**
Designing of RO desalination system. Designing of distribution network. ***Indicator:*** *Capacity of desalinated freshwater supply available during dry spells drought and flooding.*	1.3.1 Data Collection, Meetings, Field Visits, Topo Survey & Soil Investigation		X			UNOPS	AF	Travel - USD 5,000. IT Equipment – USD 500. Office operations and utilities – USD 1,500. Local Consultants – USD 2,000. Intl Consultants – USD 1,000.	10,000.00
	1.3.2 Designing of the Desalination system		X			UNOPS	AF	IT Equipment – USD 2,000. Office operations and utilities – USD 3,000. Local Consultants – USD 8,000. Intl Consultants – USD 2,000.	15,000.00
	1.3.3 Designing of the Distribution pipe networks		X			UNOPS	AF	IT Equipment – USD 2,000. Office operations and utilities – USD 3,000. Local Consultants – USD 5,000. Intl Consultants – USD 5,000.	15,000.00
	1.3.4 Bidding process and awarding of contracts for the Desalination Plants.			X		UNOPS	AF	IT Equipment – USD 500. Office operations and utilities – USD 1,500. Local Consultants – USD 1,000. Intl Consultants – USD 2,000.	5,000.00
	1.3.5 Bidding process and awarding of contracts for the Distribution pipe networks			X		UNOPS	AF	IT Equipment – USD 500. Office operations and utilities – USD 1,500. Local Consultants – USD 1,000. Intl Consultants – USD 2,000.	5,000.00
	1.3.6 Implementation and monitoring of the Desalination Plant and the				X	UNOPS	AF	Contractual Services – USD 50,000. Materials & Goods – USD 200,000.	250,000.00
Output 1.4 :									**35,000.00**
Existing wastewater management systems redesigned and improved to ensure sufficient quantities of safe groundwater during dry periods. ***Indicator:*** *Number of planned wastewater management and sewage systems which integrate targeted measures to reduce ground water pollution.*	1.4.1 Meetings & Field Visits, House hold data Collection		X			UNOPS	AF	Travel - USD 5,000. IT Equipment – USD 500. Office operations and utilities – USD 1,500. Local Consultants – USD 1,000. Intl Consultants – USD 2,000.	10,000.00
	1.4.2 Preparation of an Action Plan			X		UNOPS	AF	IT Equipment – USD 500. Office operations and utilities – USD 2,500. Local Consultants – USD 3,000. Intl Consultants – USD 4,000.	10,000.00

EXPECTED OUTPUTS	PLANNED ACTIVITIES	TIMEFRAME				RESPONSIBLE PARTY	PLANNED BUDGET		
And baseline, associated indicators and annual targets	*List activity results and associated actions*	Q1	Q2	Q3	Q4		Funding Source	Budget Description	Amount (USD)
	1.4.3 Implementation of the planned activities				X	UNOPS	AF	IT Equipment – USD 2,000.	15,000.00
								Office operations and utilities – USD 3,000.	
								Local Consultants – USD 3,000.	
								Intl Consultants – USD 3,000.	
								Contractual Services – USD 2,000.	
								Materials & Goods – USD 2,000.	
TOTAL UNOPS									**620,000.00**
Output 2.1:									**76,800.00**
Community consultations on each target island ensure participative design, sustainability and continued maintenance of integrated water resource management schemes	Seminar for councillors		X			MEE	AF	71600 Travel	9,500.00
								72700 Hospitality	3,000.00
								74500 Misc	500.00
								72500 Supplies	300.00
	Team composition and preparation for Community consultation mission		X						
	Community consultation mission		X	X		MEE	AF	71600 Travel	5,000.00
								74500 Misc	500.00
	Willingness to pay mission			X		MEE	AF	71200 International Consultants	45,000.00
								71300 Local Consultant	3,000.00
								71600 Travel	5,000.00
	Inceptions		X			MEE	AF	72700 Hospitality	4,000.00
								74500 Misc	500.00
								72500 Supplies	500.00
Output 2.2:									**20,500.00**
Targeted training events conducted in each region to strengthen water user participation and skills in adaptive, integrated water resource	Design a campaign for the duration of the project			X		MEE		72100 Contractual Services	15,000.00
								74200 Audio Visual & Print Prod Costs	3,000.00
								74500 Misc	2,500.00
M&E				X	X	MEE	AF	71600 Travel	**2,000.00**
PMU									**60,900.00**
			X	X	X	MEE	AF	71400 Contractual Services - Individuals	36,900.00
								72500 Supplies	5,000.00
								72210 Machinery & Equipment	4,000.00
								71600 Travel	5,000.00
								74500 Misc	10,000.00
TOTAL Ministry of Environment & Energy									**160,200.00**
TOTAL UNOPS & Ministry of Environment & Energy									**780,200.00**

ANNEX 1

Project Initiation Seminar for Stakeholders – 25 April 2012

The project initiation seminar was held on 25 April 2012 at Nasandhura Palace Hotel. The Project, to increase climate resilience of the Maldivian islands through a water management programme which will deliver climate-smart freshwater solutions to vulnerable communities, was launched by the Minister of Housing and Environment, Dr. Mohamed Muizzu. In his statement the Minister highlighted the importance of the project in addressing severe shortages of freshwater that approximately 60 percent of the population faces during the dry monsoon period as a result of climate change. The Minister expressed confidence that this project would benefit the surrounding island communities in addition to the approximately 6000 people in Haa Alif Ihavandhoo, Alif Dhaalu Mahibadhoo and Gaafu Dhaalu Gadhdhoo. Reinforcing the message that the Government's quest to safeguard the country against climate change will continue, the Minister of Housing and Environment, Dr. Mohamed Muizzu, said that in addition to setting up a system that the people want, the project will create awareness and build capacities on the islands to deal with the issue of water scarcity, and create a network that will connect nearby communities in need.

Speaking at the seminar launch, Gadhdhoo Island Councilor, Mr. Mohamed Rizan, acknowledged the initiative as being much needed for communities, and requested for consultations with the people to continue throughout the project. The councilor also noted that what was of importance was that the charges were affordable so that the system could be sustained.

The seminar provided information on the project, presented conceptual designs and provided the opportunity for initial feedback and discussion between the respective atoll and island councilors, technical officers from the government agencies, regulatory agencies and utility operators in the regions.

The project results framework was discussed. Major changes were not made to the results framework. Changes proposed are listed in the Results Framework, on page 10.

During discussions the Atoll Councilor of Haa Alif Atoll Mr. Yoosuf Siraj spoke of the experience of the system installed in Dhidhdhoo island after the Tsunami of 2004 where lack of use had destroyed it, this was because the rehabilitation project had also provided 2500 litre water tanks. The tanks meant that all households utilized their own rainwater. The plant was only needed when they ran out of rainwater. So by the time the rainy season was over the plant was not in a usable condition. This could impact the cost of operations as customers may not use the system should they have access to rainwater. He also noted that clean water can only be taken after flushing of roofs and this is not always possible as a heavy rain may occur during the night.

The Island Councilor from Mahibadhoo Mr. Hassan Nah expressed his concern on the availability of land for building the plant and tanks as the island was very congested.

The key points of the presentation given by UNOPS are listed below:

1. Optimum use of rainwater harvesting
    - Domestic based rainwater harvesting system (DRWH)

- Extensively practiced in almost all islands for potable water requirement including the targeted islands
- Water quality needs improvement in most cases
- Storage facilities may be inadequate to reserve sufficient water to cover the entire dry period

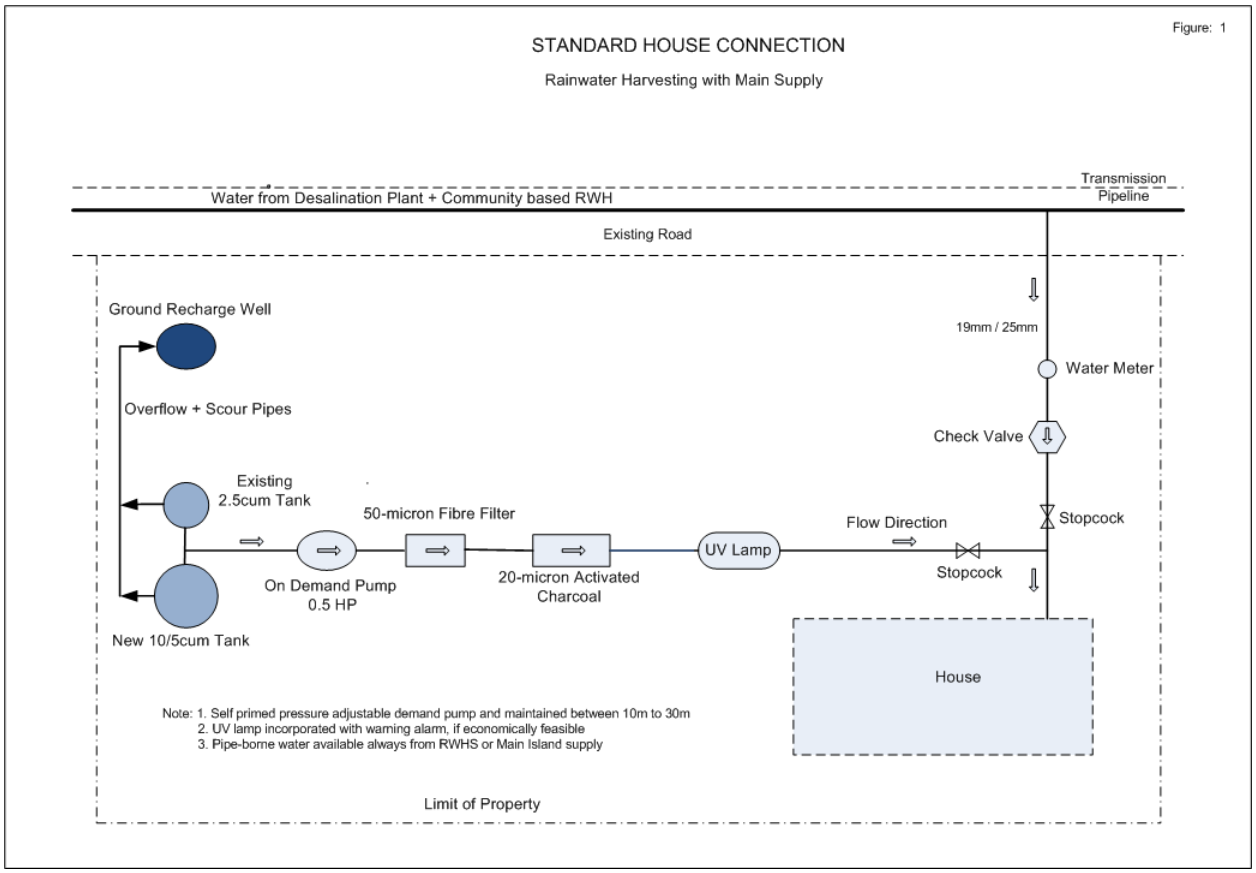
- Community based rainwater harvesting system (CRWH)
    - Largely underutilized in the targeted islands and action would be taken to exploit this avenue under this program

2. Exploitation of groundwater source
    - Shallow aquifer of groundwater available in the islands have been contaminated due to:
    - Over exploitation
    - Saline water intrusion
    - Leaking of sewage due to poorly maintained soak-away pit
    - Unsuitable for drinking without extensive treatment
    - Could be used for bathing, washing, livestock, etc. with low health risk
    - Quality of groundwater could be improved gradually with artificial recharging in addition to natural replenishment
3. Desalination of climate-resilient saline water
    - A desalination plant would be constructed under this program to ensure availability of minimum quantity of potable water at all conditions. The system parameters shall be based on the following criteria:
        - Design horizon - 2030
        - Optimal water consumption is estimated at 20litres/day/head (drinking and cooking only)
        - Non Revenue Water (NRW) shall be limited to 5% for this new water supply schemes
        - Service coverage is 100% and all houses shall be connected to the nearest main supply pipeline by incorporating water meters
        - Bulk water meters shall be installed at all strategic locations including for raw water and treated water
        - Pumping efficiency shall be in the region of 50% to 75%
        - Plant operation time shall be about 15hrs initially and gradually increased to 20hrs by 2030, this would allow a flexibility in production capacity by 10 to 15%
4. Transmission and distribution system incorporated with direct house connection
    - The local specifications (MHE & EPA) and other internationally recognized standards would be adopted for this purpose.
        - Pipeline would be designed for 2045 demand
        - PE pipe materials would be used for transmission and distribution lines
        - PE materials with compression fittings would be used for house connection
        - PE 80/100 material with minimum nominal pressure rating of PN 6
        - Valves shall be of DI material
        - Minimum pipe diameter - 63mm
        - House connection with 19mm diameter pipe and metered
5. Improvement of sanitation facilities
    - Limited technical assistance would be provided for improvement of wastewater management
    - A new sewage treatment plant has been recently constructed and completed for Mahibadhoo

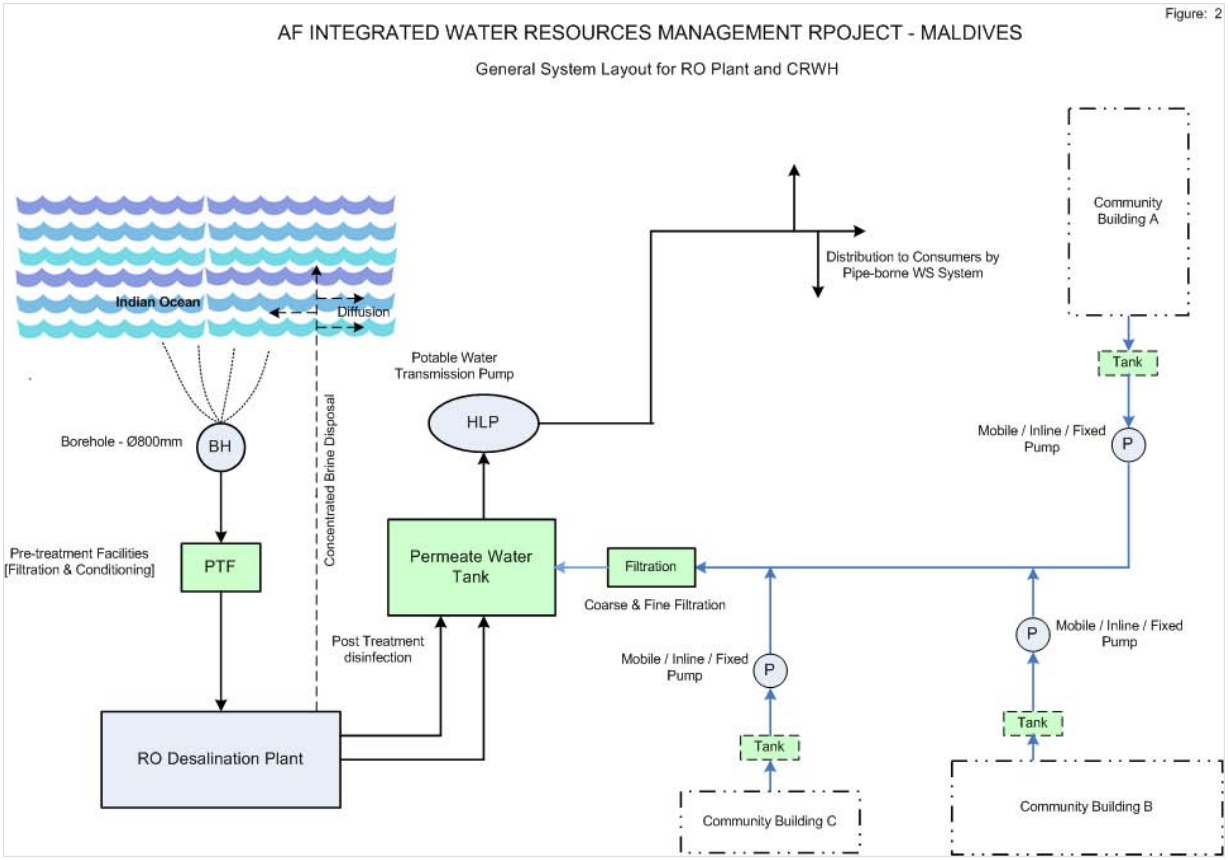
- New sewage treatment plants have been on the pipeline for Ihavandhoo and Gadhdhoo and detailed final engineering designs already completed

Technical Diagram

Domestic Rainwater Harvesting System improvement, Ground water Recharging setup and House connection from the Community Rain water Harvesting / Desalinated water supply System.



Technical Diagram: Community based rain water harvesting and pipe connected central distribution system and desalinated water supply system.



Summary discussion points raised on the proposed basic concept design are;

- Provide detail on how the capacities, e.g. 9000cbm, for storage tanks were chosen in the basic concept design.
- Take into account that 50mm intensity rainfall incidences are very few and happen only once or twice a year.
- Community rainwater tanks of which sometimes there are two or three are inefficient and do not have maintenance plans. Incorporate maintenance mechanisms for after project sustainability. Base calculations on community water tanks on available catchment area of public roofs and rainfall intensity.
- Reverse osmosis plant capacities proposed would take 3 months of continuous operation to fill the storage tanks proposed. Consider in the design that this means that the plant would not need to be operated for a long period afterwards which will cause the membranes to deteriorate and the plant to breakdown when next needed.
- Intake for reverse osmosis plant from a beach well may not be sustainable. Explore pipes and boreholes and beach wells to compare and show which is more efficient.
- Ensure rainwater is treated before entering the distribution network.
- Learn from experiences of road side drains in the capital island Male' which were designed as a ground water recharge mechanism. The drains were implemented without any information on if the design works. The drainage system that was established is difficult to maintain and is a breeding ground for mosquitoes and rodents.

- Note that thin columns in drainage pits can result in flooding and excess runoff water will go to the sea when saturated.
- Central overhead tanks to be explored in relation to pumps that will need to run continuously in view of energy consumption.
- Present different innovative options for ground water recharge systems citing advantages and disadvantages for consideration. Consider green options.
- The Maldives Water and Sewerage Company expressed interest to put forth suggestions and designs based on their knowledge and experience of installation and operation and maintenance of reverse osmosis plants and water networks. The basic design proposed currently is very manual and traditional when newer technologies exist. Care to be taken during the selection of Reverse Osmosis plant suppliers as the country has experienced difficulties in the past for obtaining spares. Ensure that international suppliers with a presence in the Maldives are given preference.
- When preparing work packages for bidding ensure that adequate project monitoring personnel, i.e. island engineers are present. It will be difficult to monitor many contractors by a single engineer.
- Small contracts to island communities may not necessarily result in cost effectiveness. Explore past experiences.

AGENDA
25 April 2011, Wednesday, Nasandhura Palace Hotel

Arrival of Participants

Recitation of Holy Quran

Welcome Address Mr. Abdullahi Majeed, Deputy Minister - Environment

Remarks by ADh. Mahibadhoo Island Councilor Mr. Hassan Nah

Remarks by GDh. Gadhdhoo Island Councilor Mr. Mohamed Rizan

Remarks by Implementing Partner the United Nations Resident Coordinate and Resident Representative for UNDP Mr. Andrew Cox

Launching of the Project by Honorable Minister of Housing and Environment Dr. Mohamed Muizzu

Address by Honorable Minister of Housing and Environment Dr. Mohamed Muizzu

Tea / Coffee Break

Project Components, MHE – Afsal

Presentation of Project Implementation Plan and Conceptual Design, UNOPS

Discussion and questions

Concluding remarks

HA Ihavandhoo, ADh Mahibadhoo and GDh Gadhdhoo
Provision of Safe and Reliable Drinking Water
Project Initiation Seminar for Stakeholders
25 April 2011, Wednesday, Nasandhura Palace Hotel

Attendance Sheet

	Name	Office	Designation	Signature
1	Aminath Athifa	Planning Section	Dep Executive Director	
2	Mohamed Azim	Planning Section	Assistant Planner	
3	Mohamed Ikleel	Engineering section	Senior construction officer	
4	Afsal Hussain	Water & Sanitation Section	Environment Analyst	
5	Hamdhoon Mohamed	Water & Sanitation Section	Environment Analyst	
6	Abul Khair Mohamed Ibrahim	Water & Sanitation Section	consultant	
7	Hassan Saeed	MWSC	Business development manager	
8	Mohamed Rasheed	MWSC	Engineering manager	
9	Ibrahim Izhan	Upper North Utilities	Sen Financial Analyst	
10	Hussain Hameez	Upper South Utilities	Technical Director	
11	Fathimath Zeena Ali	Local Government Authority	Director	
12	Aishath Afaf	Local Government Authority	Project Offcier	
13	Yoosuf Siraj	Ha. Atoll Council	Council Member	
14	Mohamed Nizam	Gdh. Atoll Council	Council Raees	

15	Mohamed Rizan	Gdh. Gadhdhoo Council	Council Raees	
16	Nizar Abdulla	Gdh. Gadhdhoo Council	Council member	
17	Hamza Qasim	Adh. Atoll Council	Atoll Councilor	
18	Hassan Nah	Adh. Mahibadhoo Council	Council Raees	
19	Abdulla Hassan	Adh. Mahibadhoo Council	council member	
20	Azzam Ibrahim	Stelco	Sen. Engineer	
21	Ahmed Sharuneez	Stelco	Engineer	
22	Mohamed Mustafa	Environment Protection Agency	Director	
23	Yazeed Ahmed	Environment Protection Agency	Engineer	
24	Ali Mishal	Environment Protection Agency	Assistant Engineer	
25	Akram Waheed	Maldives Energy Authority	Assistant Engineer	
26	Fathmath Rukshana	Maldives Energy Authority	Senior accounts officer	
27	Alejandro Ruiz Acevedo	UNOPS	Liasion and Coordination Officer	
28	Sivakolundu Srikandarajah	UNOPS	Senior Program Manager	
29	Kandiah Vinayamoorthy	UNOPS	Technical Manager	
30	Eemaan Rameez	UNOPS	National Programme Officer	
31	Mohamed Inaz	UNDP		
32	Azusa Kubota	UNDP		
33	Aminath Ibrahim	UNDP		

34	Fathimath Sofa	UNDP	Programme Assistant	
35	Mihad Mohamed	UNDP		
36	Amjad Abdulla	MHE		
37	Ali Shareef	MHE	Asst. Dir	
38	Ahmed Waheed	MHE		
39	Najfa Shaheem Razee	MHE		
40	Hussain Naeem	MHE		
41	Mohamed Riyaz	MHE/ OPP		
42	Abdulla Shibau	MHE/ AEC		
43	Mohamed Rashad	MHE/ Housing		
	Aminath Vijna Mohamed	MOTAC - TAP.	Administrative & Finance assistant	
	Fathimath Shahuza	Water & Sanitation Section	S. Data Processing Officer	
	I. Naeem	EPA	DG	
	FARooq M. HASSAN	TAP / MIN OF TOURISM	NATIONAL PROG. MANAGE	

ANNEX 2

Inception Workshop – 20 June 2012

The objective of the workshop was to review and endorse the project results framework, final project design and implementation arrangements, including suitability and sustainability of the proposed concept design for the system.

The workshop was inaugurated by the Minister of State for Environment and Energy, Mr. Abdul Matheen Mohamed. The State Minister highlighted the importance of addressing the problems caused by climate change to the water resources of the Maldives. The State Minister thanked the participants for their support and participation and encouraged the sharing of experiences in past projects in ensuring that the Project would be a success.

Ms Azusa Kubota, UNDP Programme and Operations Coordinator of Maldives outlined the urgency in implementing this project, considering the impacts of climate change is on a country such as the Maldives, and the scarcity of water island communities' face during dry periods. Ms Kubota also highlighted the importance of putting the community at the centre of the project and the opportunity for Maldives to demonstrate innovative adaptation methods

A brief introduction of the project outlining the outcomes, management arrangements and project design and implementation strategy and the results framework was presented to the participants by Ms. Najfa Shaheem Razee, Project Manager. This was followed by a presentation on the projects main integrated water resources management approach to address the shortages of fresh water faced by the communities in Ihavandhoo, Mahibadhoo and Gadhdhoo islands.

A presentation was made by UNOPS on the basic concept design for integrated water resource management proposed for the project.

The projects results framework was discussed in three groups where participants discussed and made comments to the results framework and integrated water resource management approach. The changes proposed to the results framework was shared among the participants for further discussion. The suggested changes are included in the logframe on page 10.

The recommendations for the project and the risks identified from the discussions were;

- Communicate and include the island communities throughout the project implementation through the island councils.
- Project interventions on for rainwater harvesting in households and the storage tanks to be build for community buildings should be considered in terms of sustainability when operating a reverse osmosis plant. Reverse osmosis plants require regular operation to preserve membranes within the system. Past experience of small reverse osmosis plants that were installed in islands following the tsunami have broken down due to a lack of use. This was the result of providing 2500 litre rainwater storage tanks to all the households on these same islands. This meant that the demand for desalinated water dropped.
- In some cases the plants manufacturers did not have a representation in Maldives and it became difficult to obtain plants. These plants are now mostly obsolete. Critical infrastructure investments such as reverse osmosis plants need to be installed in view of these sustainability issues.

- The willingness to pay for freshwater supply must be thoroughly analyzed. It has been difficult to convince communities who didn't pay previously to pay in the past. Specifically this has been the experience where state provided electricity infrastructure exists. Privately owned and operated electricity generation stations had not faced this problem.
- The utility company representatives present noted that it was sometimes difficult to get government agencies that defaulted on payments to clear their payment.
- Connections to empty plots of land or houses where families have to move to live on other islands were discussed. The consensus amongst the participants was to provide connections to all registered households.
- Explore modern technologies for ground water recharge system and a mechanism to monitor the water quality beyond the life cycle of the project.
- Look for alternative ways to disinfect the water at household level as the proposed UV lamp and filters were expensive and required annual replacement.
- Present varieties of engineering options in light of varying situations in the three islands.

A general comment by all three groups on the results framework was that it did not identify who the responsible party for verifying the indicators was, which is important as different bodies had access to different sources of verification identified in the results framework.

The meeting was concluded by the project manager highlighting that the changes made to the results framework will be presented in the next meeting and noting that discussions will be held to form a technical committee to validate the IWRM designs and the comments made in this meeting.

AGENDA
Venue: Nasandhura Palace Hotel

Recitation of Quran – Mohamed Mahid Moosa
Opening Statement – Minister of State Mr. Abdul Matheen Mohamed
Remarks by UNDP Maldives
Introduction of the Project – Najfa Shaheem Razee
Project Design and Implementation Strategy
Break
Group Discussion and feedback on project result framework
UNOPS presentation – community consultations, concept design & schedule
Discussion on suitability and sustainability of design proposed
Closing of Workshop
Lunch

Increasing Climate Resilience through an Integrated Water Resource Management Programme in the Islands of H.A. Ihavandhoo, A. Dh. Mahibadhoo, and G.Dh. Gadhdhoo

Inception Workshop – 20 June 2012

	Name	Office	Designation	Contact No	Email	Signature
1	Ibrahim Hameed	Ministry of Home Affairs	Assistant Director			
2	Ahmed Mubarik	Ministry of Fisheries and Agriculture	Senior Project Officer			
3	Mohamed Adly	Ministry of Tourism, Arts and Culture	Assistant Director	7772830	adly@tourism.gov.mv	
4	Mohamed Nahid	Ministry of Tourism, Arts and Culture	Environment Officer	9676168	nahid@tourism.gov.mv	
5		Ministry of Finance and Treasury				
6	Aminath Shaufa	Ministry of Health	Public Health Program coordinator	7504075	Shaufa@health.gov.mv	
7		Ministry of Gender, Family and Human Rights				
8		Ministry of Foreign Affairs				
9	Fathmath Thasneem	Disaster Management Centre	Dep Minister			
10	Hisaan Hassan	Disaster Management Centre	Project Director			
11	Mohamed Mustafa	Environment Protection Agency	Director	7782393		
12	Ali Mishal	Environment Protection Agency	Assistant Engineer			
13		Maldives Energy Authority				
14	Imad Mohamed	Local Government Authority	Senior Planning Officer			
15	Aishath Afaf	Local Government Authority	Project Officer	7714638	aishath.afaaf@lga.gov.mv	
16	~~Mariyam Dheena Saifh~~	Upper North Utilities	HR Manager			
17	Hussain Hameez	Upper South Utilities	Technical Director			

18	Musthafa Hassan	Upper South Utilities	Dep Technical Director			
19	Shaheedha Adam Ibrahim	Water & Sanitation Section				
20	Hamdhoon Mohamed	Water & Sanitation Section				
21	Fathimath Shahuza	Water & Sanitation Section				
22	Nasir	Water & Sanitation Section				
23	John Dorr	USAID Project	Chief of Party - Maldives NGCCP			
24	Hanima Mohamed	Environment Section	Enviromental Analyst			
25	Ali Shareef	Climate Change Section	Assistant Director			
26	Amir Hassan	Climate Change Section	Project Cordinator			
27	Mohamed Asif	Climate Change Section	Enviromental Analyst			
28	Saravan Govindarajan	UNOPS	Technical Project Office	7753465	Govindarajans@ unops.org	
29	Kandiah Vinayamoorthy	UNOPS	Technical Manager	7435886	kandiahv@unops.org	
30	Eemaan Rameez	UNOPS	National Programme Officer	7999958	eemaanr@unops.org	
31	Mohamed Inaz	UNDP	ARR-EE			
32	Azusa Kubota	UNDP	P.O.C.			✓
33	Mihad Mohamed	UNDP	Project Manager	7562864	mihad.mohamed@UNDP.ORG	
34	Hassan Saeed	MWSC	BDM.	7944177	hsaeed@mwsc.com.mv	
35	Mohamed Afraz	MWSC	AEC	7956535	mohamed.afraz@mwsc.com.mv	
36	Khadheeja Naseem	Transparency Maldives	Project Cordinator	7782224	khadeeja.naseem@transparencymaldives.org	
37	Azim Zahir	Transparency Maldives	Senior Porject Cordinator	7963431	azim.zahir@transparency	
38	Fathimath Safa	UNDP	Programme Assistant	7838761	fathimath.safa@undp.org	

39	Yoosuf Khaleel	UNUL	Network Administrator	7951597		
40	Aishath Irufa	UNUL	EXECUTIVE	9740603		
41	Ahmed Waheed	MEE				
42	FARUQ M. HASSAN	TAP/MTAC	NATIONAL PROJ. MANAGER	7773369	faruq@tourism.gov.mv	
43						
44						

	Aishath Nixama	Water & Sanitation Section				
	Fathimath Leena	Water & Sanitation Section				
	Shuaau Hameed	Water & Sanitation Section				
	Shagiya Abdul Rasheed	Water & Sanitation Section				
	Najfa	PMU - MEE	Project Manager			
	Abdulla	PMU - MEE	Admin Officer			
	Zumeena	PMU - MEE	Finance Office			

ANNEX 3

Inception Follow-up Meeting – 26 June 2012

Objectives:

- To incorporate the findings of the inception workshop into the project framework
- To incorporate the findings of the community consultation workshop into the project framework
- Discuss the roles and responsibilities of the project board, technical committee, project team and UNDP
- Refine and endorse Project Results Framework and AWP 2012

The follow-up meeting to the Inception workshop was chaired by the Minister of State for Environment and Energy, Mr. Abdul Matheen Mohamed. In his opening remarks the State Minister stressed the importance of operation and maintenance. Many sewerage and water plants established in the past had failed to continue operation. The experiences of similar past projects should be incorporated into this project for sustainable development. The State Minister emphasized that operation and maintenance should be initiated during the project's lifetime by including the technical and managerial training to ease the transfer of the water delivery system to the final operator. The State Minister also noted that the ground water recharge mechanisms should consider all possibilities of future developments such as land reclamation.

The findings of the Inception Workshop, changes to the results framework, and comments on the integrated water resource management design, the roles and responsibilities of the project board, national project director and project unit were presented by the Project Manager.

The roles and responsibilities of the UNDP Country Office and discussion were led by the UNDP ARR Mr. Mohamed Inaz. The monitoring and evaluation, risks and challenges were discussed led by the UNDP Regional Technical Advisor.

This was followed by a presentation on the findings of the community consultation visit led by Mr. Mohamed Mihad, UNDP Country Office. The community members of Mahibadhoo want the system to provide clean water enough for all household purposes all though out the year because their ground water quality has degraded beyond usability for any purpose.

Discussions and Recommendations

- Populations on islands need to be acclimatized to paying tariffs for services as donor funds will not last. Tariffs must be imposed from the start inclusive of energy consumed by the RO plant, repair and spare parts costs. Operational costs of electricity and sewerage treatment plants were not incorporated in the past and they operate at a loss. Involve the utility company as a key stakeholder in the project and provide training to the utility company on setting tariffs.
- Provide options on technical design to the community, this will allow the community to select the best option based on how much they are willing to pay. Sequencing of the projects activities for willingness to pay should include the following; a basic survey, follow-up concept designs, detailed willingness to pay survey.

- Connection to vacant plots: all registered household land plots are to be connected to the water supply network. When finalizing the design for the network, the land use plan for the island and the recommendations of the Island Councils must be taken into account. The network and tariffs should be in compliance with the requirements set by regulatory authorities.
- The proposed basic concept design by UNOPS incorporates pits in the periphery which may become redundant or need removal. The recommendation was to study island land use plans, including future forecasts of future development including land reclamation.
- The designs for the RO plant should consider the capacities and possibilities of expansion in the future without over designing and reduce the operational costs by incorporating rainwater harvesting.
- Selection of manufacturers for RO plants should be based on ease of obtaining spare parts.
- Clarification on the services provided by UNDP with respect to the 8.5% fee levied for the project was sought. In direct implementation modality all support services and technical services are paid for. UNDP will charge fees for any implementation support provided at the request of the Government.
- Clarification on the roles of UNOPS personnel.Under the proposed managerial structure of UNOPS for this project 3 staff, one engineer, one technician and one logistic staff will be hired on each island. The State Minister inquired on the number of staff to be hired and stressed the importance of ensuring local staff are hired. It was agreed that this management structure will be further discussed and agreed with the Ministry. The detailed terms of references of the key UNOPS Maldives Operation Centre are provided in annex 5
    - Technical Project Manager – KandiahVinayagamoorthy
    - Technical Project Officer – GovindarajanSaravanan
    - Island Residential Engineers – to be hired.
- The design engineers must physically visit the islands during the detailed designing phase. for example, the roads in Mahibadhoo are very narrow and have to accommodate sanitation, electricity, telecommunications and the water network. It will not be possible for the water supply connections to be made to two opposite households as shown in the basic concept design.
- Include a mechanical engineer to supervise the RO plant.
- Preparation of the inception report within 2 months from the inception meetings is a crucial aspect of project planning. The appointment of National Project Director and project board members will be done before the submission of the inception report.
- A project performance review will be conducted yearly and a midterm evaluation will be done for the project in next year October.

Lessons Learnt: Male' Water And Sewerage Company (MWSC)

The MWSC presented lessons learnt from the operation of desalination plants. The following parameters were suggested as design objectives:

1. Minimize Over sizing:
    - Optimize capacity to meet short-term demand
    - Facilitate expansion in future.
2. Operational Viability:
    - Energy Efficiency (Energy Recovery, Solar Integration, Rainwater Harvesting)

- Stringent Operational Standards to minimize waste
- Preventive maintenance to optimize output efficiency

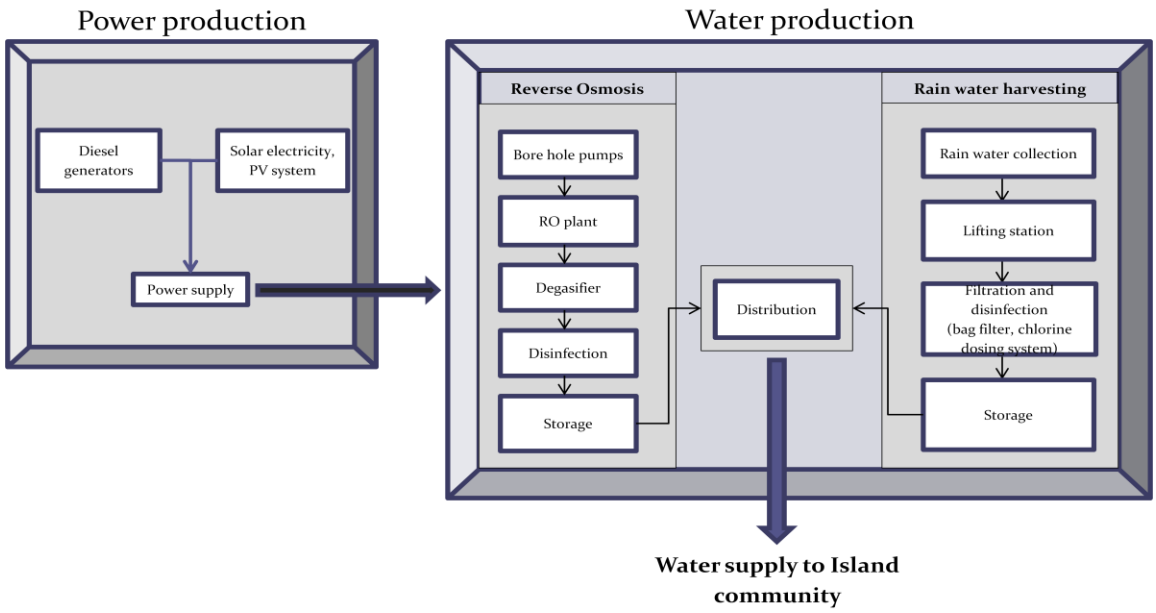
3. Continuous Service:

   - Contingency Planning
   - Mitigating Operational Risk

4. Financially Feasible:

   - Setting expected return on each investment
   - Maximize revenue collection
   - Control overhead cost.

The FEN Engineering Solution which was included in the presentation is presented in the diagram below.



In addition their presentation included a product (Aquacell) for infiltration and recharge of groundwater that can be fitted on streets, playgrounds etc. These can be assembled together to form an underground structure which can be used for temporary storm water storage to limit the outflow or to let the storm water infiltrate into the surrounding ground.

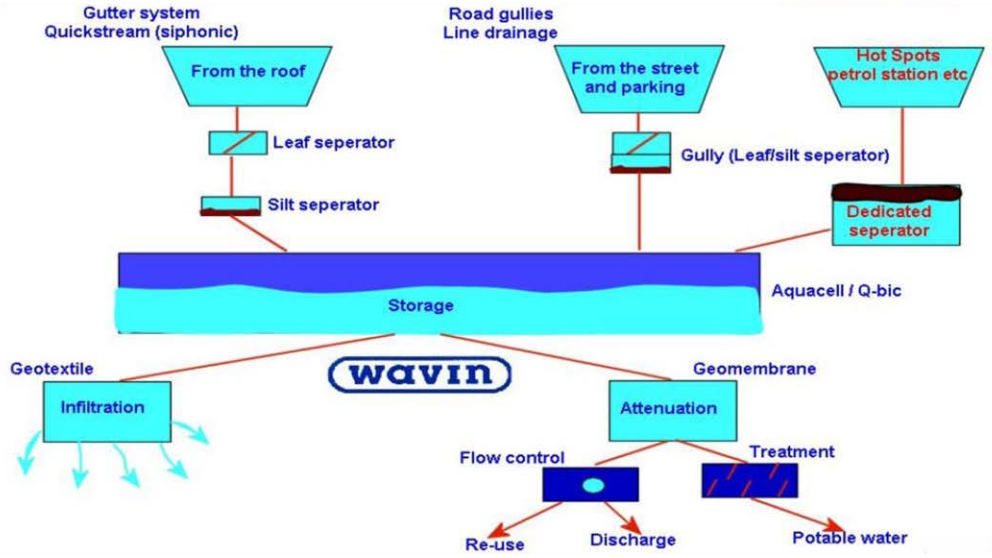
- Aquacell holds up to 95% of its volume in water
- It can be installed in layers and hence the storage can be built in the horizontal plane as well as in depth.
- Minimal on digging and a minimum on surface re-instatement (asphalting etc).
- Installation is efficient and quick.
- No special or heavy equipment is needed and no time for curing required.
- Minimum on special backfills is required.
- Controlled and reduced volume discharge into existing main sewer system

- Significantly reduced risk of flooding
- Infiltration of rainwater into the ground
- Sustainable, cost effective management of the water environment
- High strength and rigidity

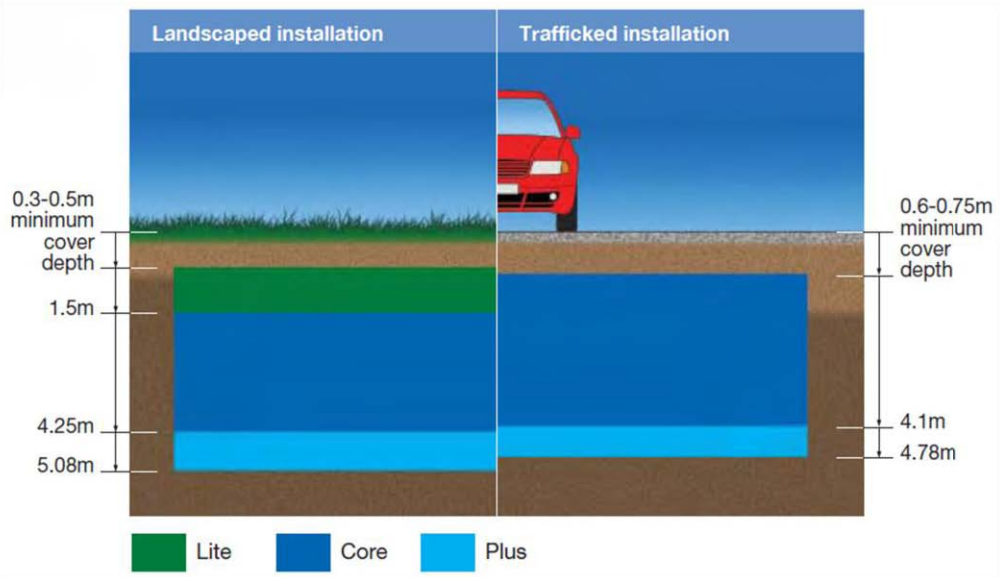
The following pictures and diagrams depict this system and some reference projects where they have been used.

Large scale AquaCell storage tank

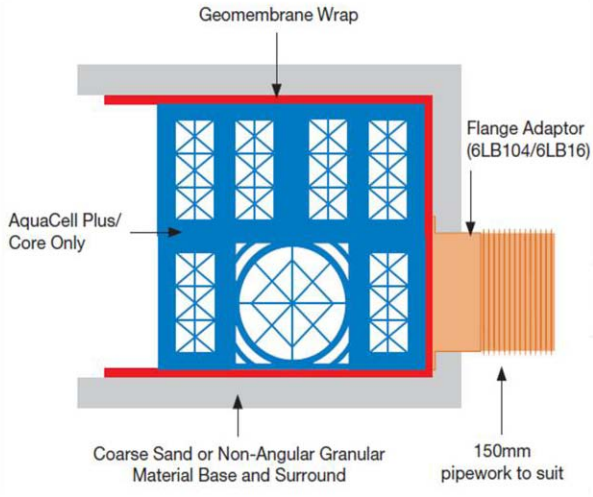
Overview of Wavin water management system

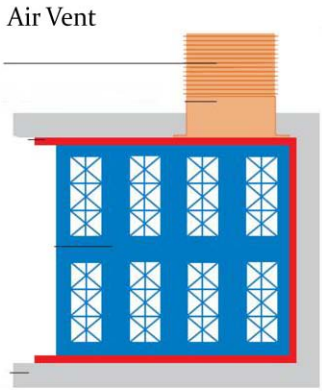


AquaCell Installation Depth



AquaCell: Typical Installation





It is recommended that one vent pipe, 110mm in diameter, is provided per 7,500 square meters of impermeable catchment area

Short list of a selection of reference projects

Country	Object	Problem	Solution	Size
UK	Birmingham airport	Urbanisation results in too much water in the city storm water system	soakaway, installed under the car park	1.300 m^3
UK	Illchester cheese company	During heavy storm, the factory is flooded	Attenuation to hold the water till after the heavy storm	256 m^3
Slovakia	Senec wholesaler	Urbanisation results in too much water in the city storm water system	Combined infiltration and attenuation system. Water is re-used for irrigation, sprinkler installation and sanitary facilities	420 m^3
Switserland	Football stadium	Urbanisation results in too much water in the city storm water system	Infiltration system	424 m^3
Germany	Regensburg BMW	Urbanisation results in too much water in the city storm water system	Infiltration system	1.850 m^3
Germany	Berlin Olympic stadium	Urbanisation results in too much water in the city storm water system	Combination of infiltration and attenuation system. Re-use of water for irrigation and sanitary facilities	2.5000 m^3
Germany	Frankfurt football stadium	Urbanisation results in too much water in the city storm water system	Combination of attenuation and infiltration. Re-use of water for irrigation and sanitary facilities	m^3

AGENDA

Venue: Ministry of Environment and Energy, Meeting Room 3, 1st Floor

Introduction of Participants

Presentation on the findings of the Inception Workshop – PM

Presentation of roles and responsibilities of project unit, national director, project board

Presentation of roles and responsibilities of UNDP CO – Project Officer

Presentation of roles and responsibilities of UNOPS –UNOPS

Discussion of roles and responsibilities

Sharing of Experiences Utility Company - MWSC

Presentation on M&E, risks and challenges - UNDP RTA

Presentation and discussion on the findings of the community consultation visit – Mohamed Mihad

Review and refine the results framework.

Review of 2012 AWP

Lunch

Increasing Climate Resilience through an Integrated Water Resource Management Programme in the Islands of H.A. Ihavandhoo, A. Dh. Mahibadhoo, and G.Dh. Gadhdhoo

Inception Follow-up meeting - 26th June 2012

	Name	Office	Designation	CONTACT NO.	Email	Signature
1	Mohamed Adly	Ministry of Tourism, Arts and Culture	Ass Director	7772830	adly@tourism.gov.mv	
2	Mohamed Nahid	Ministry of Tourism, Arts and Culture	Environment Officer			
3	Farooq Mohamed Hassan	Ministry of Tourism, Arts and Culture	TMP PROJECT MANAGER	7773369	farooq@tourism.gov.mv	
4	Aminath Shahufa	Ministry of Health	Public health program coordinator	7504075	shaufa@health.gov.mv	Shaufa
5		Environment Protection Agency				
6	Aishath Afaf	Local Government Authority	Project Officer	7714638	aishath.afaf@lga.gov.mv	
7	Hassan Saeed	MWSC	BDM.	7944177	hsaeed@mwsc.com.mv	
8	Mohamed Afraz	MWSC	Assistant Eginew, construction	7956535	mohamed.afraz@mwsc.com.mv	
9	Azim Zahir	Transparency Maldives	Senior Porject Cordinator			
10	Khadheeja Naseem	Transparency Maldives	Project Cordinator			
11	Yusuf Khaleel	Upper North Utilities	network administrator	9740235	yusuf@unul.com.mv	
12	Aishath Irufa	Upper North Utilities	EXECUTIVE	9740603	hr@unul.com.mv	
13		Stelco				
14		Upper South Utilities				

15		National Disaster Management Centre	Asst project officer	7727406	abdullah.rafeeu@ndmc.gov	
16	Ahmed Shareef Nafees	Ministry of Home Affairs	D.G	7795775	ashareefnafeez@yahoo.	
17	Suzeena Adam	Ministry of Home Affairs				
18		Department of National Planning				
19	Hussain Faisal	Ministry of Fisheries and Agriculture	Agriculture officer	7656857	hussain.faisal@fishagri.gov.mv	
20	Yoosuf Naeem.	Ministry of Finance and Treasury	Assistant Director.	9835589.	yoosuf.naeem@finance.gov.mv.	
21	Ajwad Musthafa	Maldives Energy Authority	Deputy Director	7958100	ajwad.musthafa@mea.gov.mv	
23	Saravan Govindarajan	UNOPS	Technical Project Office			
24	Kandiah Vinayamoorthy	UNOPS	Technical Manager			
25	Eemaan Rameez	UNOPS	National Programme Officer	7999958	eemaanr@unops.org	
26	Mohamed Inaz	UNDP				
27	Mohamed Mihad	UNDP				
28	Fathimath Sofa	UNDP				
29	Azusa Kubota	UNDP				
30	Aishath Nixama	Water & Sanitation Section				
31	Fathimath Leena	Water & Sanitation Section				

32	Shuaau Hameed	Water & Sanitation Section				
33	Shagiya Abdul Rasheed	Water & Sanitation Section				
34	Najfa	PMU - MEE	Project Manager			
35	Abdulla	PMU - MEE	Admin Officer			
36	Zumeena	PMU - MEE	Finance Office			
37	Syed Nasir Abbas	MEE		7503811	nasirabbas@hotmail.com	
38	Ibrahim Akram	MWSC	Asst Manager, Marketing	7775396	ibrahim.akram@mwsc.com.mv	

ANNEX 4

Community Consultation missions of AF project to A.Dh. Mahibadhoo

Community consultations to gather community feedback on the Integrated Water Resource Management project funded by the Adaptation Fund were held in ADh. Mahibadhoo from 24th June to 25th June 2012.

The team for the community consultation mission to ADh. Mahibadhoo composited of:

- 2 technical officers from the water and sanitation section of Ministry of Environment and Energy,
- a technical Engineer from UNOPs,
- a facilitator from UNDP
- And a project staff from the project management unit.

Objectives of the mission

1. Gather lessons learnt from other projects
2. Understand and confirm community preferences and suggestions in relation to the original IWRM design option;
3. Understand the physical viability of the current option;
4. Basic information on Willingness to Pay for the continued operation and maintenance of the water supply systems.

Community consultations

Community Meeting

The first meeting, which took place from 9pm to 11pm on 24th June 2012, was held with the community members. Fifty community members attended the meeting, of which, 10 were women. Since the most prominent economic activity in the island is fishing, a lot of community members present were fishermen. However, administrative workers, social workers, businessmen and other workers/professionals from different economic activities were present. Most of the community members were middle aged but old and young people were present and active in the discussions.

After a brief introduction of participants, a presentation on introduction of the project was made by a technical staff from MEE. This presentation highlighted the goals and objectives of the project and explained in detail the outcomes and outputs of the project.

Following the introductory presentation, the Engineer from UNOPS made a presentation on the current concept designs. Details of how the capacity of the desalination plant was calculated based on the population growth of the island were explained. The current engineering designs for the community rainwater harvesting and ground water recharge system as also shared with the community.

After the presentations, the community was asked to divide in to four groups. In the four groups, the community members were encouraged to discuss the designs being proposed, experiences from

previous projects and the economic feasibility of the project. The discussions in each group were guided by a member of the mission team.

*Minutes of this meeting and the presentations are attached in ANNEX1

Meeting with the Island council

This meeting with the island councilors was held from 9.30am to 10.30am on 25th June 2012. President of the island council and 3 members of the council were present in the meeting. The findings from the community consultation mission were discussed with the council members. Experiences of the island council in similar project were shared and issues pertaining to the feasibility and physical viability of the project were discussed.

*Minutes of this meeting is attached in ANNEX 2

Meeting with Atoll council

Meeting with the atoll councilors was held from 11.00 am to 11.30 am. The president of the atoll council and 3 members of the council were present. Their experiences of previous projects were shared and suggestions to improve the feasibility of the engineering designs were given by the council members.

*Minutes of this meeting is attached in ANNEX 3

1. Lessons learnt from other projects

1. **Coastal Harbor Project:**

   This project was abruptly aborted by the contractor without a prior notice. Hence, there was some unrest as some community members wanted to show their frustrations. The island council had to intervene and control the situation. Although the council is not sure about the reason for the project being halted, they believe the situation could have been handled well if they were informed of the challenges faced by the project that forced it to a halt.

   It is essential to keep the community and councilors up-to-date on the challenges and risks faced by the project so that critical project decisions do not come as a surprise to them.

2. **The Sewerage Project:**

   This project started in March 2011 and its completion was announced in January 2012. Although the contractors have been awarded completion of the project, the community has not started receiving services. From the different speculations as to why they have not starting receiving services even after a modern sewerage system has been put in place, the most widely accepted one by the community is that the sewerage system put in place has an operational cost that the community cannot afford. The community was not consulted on their ability to pay for the system being put in place and a thorough feasibility study was not done prior to construction of the system.

   It was repeatedly highlighted by the community that what is important to the community is the service not a sophisticated system. And a sustainable service can only be provided by a system that the community can afford. So, it is critical to find out the capability of the community to pay for the system bring built and thoroughly study the feasibility of the system.

In the initial stages this sewerage project promised to deliver 3 systems; waste, water and sewerage. However, the project has only implemented a sewerage system. This has caused confusion and frustration among community members.

To achieve the full support of the community it is important to maintain community expectations and ensure that the community clearly understand the objectives, goals and limitations of the project.

The root cause of most of the failures of this project was because the community was engaged only in the beginning of the project. Community consultations and engagement activities were not carried out throughout the project. Hence, the project deviated from community aspirations and detached from the realities of the community.

The success of the project depends very much on engaging the community throughout the project. At every stage the community has to be consulted and their feedback incorporated in to the project.

When the sewerage pipelines were laid down, an electricity cable was damaged which disrupted the electricity of the whole island. The project staff of the sewerage project failed to inform the authorities on the matter and when confronted about the incident they refused to take accountability for the damage caused to the cable.

In this project, when laying the water distribution pipes, it is important to consider the existing two sewerage network pipelines, cable TV, Dhiraagu and electric cables. Also, it is recommended that contractor work with a staff from the power house to ensure safety and accountability.

One good practice carried out by this project was to always inform the councillors in advance of the areas where implementation of the pipes were to be carried out. This allowed the councillors to keep the community informed so that their routine work could be adjusted accordingly.

It is recommended that the work schedule be shared with the island council in advance.

The project duration prolonged more than planned. Hence, a large portion of fund was wasted on project management cost.

It is recommended that optimum time be taken for design and implementation phase of the project.

2. Community preferences and suggestions to the original IWRM design option

1. General

Lots of people in the island are currently using bottled water for drinking and cooking. **Will the water provided by this system be better or equal to the standard of bottled water?**

In the current design, the capacity of the water produced is 20 ml per head, does this mean there is limitation on how much each person can use?

The ground water of the island is contaminated beyond usability for any purpose. The current design needs to take this in to consideration and change the engineering design to provide enough water throughout year for all house hold purposes.

2. **Community Rain Water Harvesting**

This is previously free. But, the set back is that the roof tops of these community buildings are not cleaned regularly hence safety of the water collected is questionable. So, the community is willing to pay for it with the guarantee that the collection is maintained by an accountable body and assurance is given that the collected water is clean and suitable for drinking.

Suggestion: Leave the existing tank at the mosque as it is, without connecting it to the network.

Storage tanks designed to be built near the community buildings should be build in a way that it does not inhibit extension of the building. For an example, the initial location suggested for the tank near the hospital needs to be changed so that it does not get in the way of expanding the building.

Currently some of the community members use desalinated water even when harvested rain water is available because they feel the harvested rainwater is not safe to drink. Hence, the system implemented by this project will need to provide assurance to the community that the collected water is clean and safe to drink.

3. **Desalination plant**

Mahibadhoo is a densely populated island. Since land is a scare resource, it is recommended that the space allocated for the desalination plant and storage tanks be reduced as much as possible. Some of the recommendations are that instead of extending the current building for the desalination plant; make it a two story building. Also, instead of making the storage tanks wide, increase the height of the tanks whenever possible to reduce land area utilized.

Even now, during the dry season, water is provided to the nearby islands from the desalination plant of Mahibadhoo. Hence, it is recommended that this be taken in to consideration when deciding the production capacity of the plant.

4. **Ground water recharge system**

The current design is to use only the flush water from the community buildings. Suggestion from the community is to integrate the flush water from the households in to this system so that the recharge system is enhanced.

For the ground water recharge system to be fully successful it is necessary to prevent the septic tanks from leaking in to the ground. So it is recommended this project looks at the existing sewerage system to ensure that septic tanks are properly installed and also look in to the possibility of enhancing the existing sewerage system to use sufficiently treated wastewater to recharge the ground water.

Overall perception towards the current design is positive as it aims to address the issue with a simple solution that is less costly.

5. **Others**

New families are forming rapidly and new households built quickly. So it is important to make it easy to create new connections to these houses.

For awareness campaigns, trainings and workshops it is recommended that school children and women be involved.

The operation of the system might be more sustainable if both the sewerage and water systems are operated by one organization.

3. Physical viability of the current designs

1. **Land**

Land is a scarce resource in Mahibadhoo with a population density of more than 90 persons per hector. The physical viability of the current design depends very much on reducing the land utilized by the system put in place. The recommendation is to reduce land utilization as much as possible.

The household tanks in the houses takes up precious space so it is very important for the new system to provide enough water for all household purposes so that there is no need for the household tanks.

4. Basic information on willingness to pay

1. **Home use**

The community is willing to pay a reasonable price. They understand that the price might be higher than Male because of population density in Male but an exorbitant amount will not be acceptable.Even now, some people want to buy desalinated water. Some even want to install a pipeline to their house from the current desalination plant. But, the council is not able to provide this service because the production capacity of the current plant is not sufficient. “The island economy is good enough to pay a reasonable amount to sustain the system” – President of Island Council.

2. **Commercial use**

For the suitability of the system, it is important that it be used for commercial purposes. One of the most immediate and rewarding avenue for this is providing water for the fishing boats. Fishing boats from Mahibadhoo and neighboring islands are interested in buying water if supplied from the harbor. Also, neighboring islands might be willing to buy water for their home use.

It is recommended that on top of enabling the system to cater for commercial use, the tariff system be explored further to establish an operational system that is sustainable.

Limitations of the mission and suggestions

The meeting held with the community members in this mission lasted for about two hours. Although, essential information was collected in this meeting, due to restriction in time, all the topics were not thoroughly explored. If more time was available, the design concept could have been discussed with the commu8nity in depth and their feedback obtained more comprehensively.

The information collected on the willingness to pay was collected at a very superficial level and the information is not very reliable. A proper questionnaire and methodology was not used to obtain more consistent information from the community.

When the actual willingness to pay survey is done, it is recommended that more in-depth community consultation be done and the information provided from this trip be used only as very basic information.

Minutes of community consultation meeting

24th June 2012, 9pm – 11pm

Group 1

- Willing to pay a reasonable price for the system
- households need to be connected to the ground water recharge system
- Some of the community members currently use desalinated water even though rain water is available.
- This system needs to provide water enough to be utilized for all house hold purposes
- Since in the current design, water is produced at the rate of 20 liters per head with a storage capacity of 15 days, will there be a limit to the use of water?

Group 2

- Want to use water for all household purposes
- New families are forming rapidly so it should be made easy to create new connections to these households
- How long will it take for the ground water to be recharged?
- It is critical to prevent septic tanks from leaking in order for the ground water recharge system to be successful.
- How will the tariff system be like? Will it be the same price as Male? Willing to pay higher than male but not extremely high.
- Will the quantity of water provided be equal to the amount provided in Male?

Group 3

- Important to connect the household flush water in to the ground water recharge system.
- Rain water harvested from the community buildings is previously free. But the concern of the community with the current system is that the roof tops of the community buildings are not properly cleaned, hence, the water harvested from the buildings are not trusted safe by the community members.

- Suggestion is to not connect one of the existing community rain water harvesting tanks in the mosque to the system being built as some community members might want to use this free service from time to time.
- Suggestion is to treat the wastewater and use it for ground water recharge.
- The community is willing to provide water to neighboring islands as they have been doing in the dry periods. If possible, it is recommended to sell water to the neighboring islands on a regular basis when the new system is put in place.

Group 4

- Reduce the space allocated for the expansion of the desalination plant and building of the storage tanks.
- It is important to involve the school children and women in the trainings and workshops.
- The household tanks in the houses takes up precious space so most important is for the new system to provide enough water for all household purposes so that there is no need for the household tanks.
- Now in most households, bottled water is used for drinking
- willing to pay any amount for the desalinated water
- Who is going to operate and maintain the system? Will the system be operated and maintained only through the payment made by households? Suggestion is for the sewerage system and this water system to be operated by the same company.
- The community buildings are not cleaned properly now so, if the community is to pay for it, the expectation is for it to be regularly and thoroughly cleaned.

Minutes of meeting with the island council

25th June 2012, 9.30am – 10.30am

Past experiences:

- Coastal project started at the south harbor by MTCC was aborted abruptly at the second phase without any prior notice or explanation. And there was chance of unrest by the community but the council intervened and prevented it.
- **Sewerage Project:**
    - Started in March 2011 and project completion was announced in January 2012. But still no service is available. The community wants services as soon as the project is implemented.
    - Initially the sewerage project was introduced as a project that will deliver three systems; water, waste and sewerage but in the end, it delivered only a sewerage system.
    - The community has given their full cooperation to this and all other previous projects.

Comments on the current design:

- Increase the height of the tanks that uses pumps so that land space is saved
- Instead of expanding the building for the desalination plant, make it a two story building.
- There is good support from the community for the ground recharge system as the current design will also reduce puddles in the roads.

- UNOPS requested to propose 3 different designs for the tanks.
- Tank designed for the hospital should not get in the way of extension of the building.
- When laying the pipelines extensive care should be given to not disrupt the existing pipelines and cable networks.
- After the pipelines under the sewerage system were laid out, there was a power failure due to damaged electric cables but the project refused take responsibility for the damage.
- When laying pipelines is suggested that someone from the power house accompanies the project team so that there is verification and accountability.
- When laying the pipelines, it is important to let the council know of the schedule in advance so that they can inform the community. This was practiced in the sewerage project and helped to minimize community frustrations.

Willingness to pay

- Even now some want to buy desalinated water, some even want to install pipeline to their households but the council cannot sell the water because the production capacity of the plant is not sufficient.
- The island economy is good so it will not be too difficult for people to pay for the water.

Minutes of meeting with the atoll council

25th June 2012, 11.00am – 11.30am

- The sewerage project involved the atoll council at the beginning of the project but then later there was no involvement.
- It is important to provide paid services to the public
- The payment for the water should be high enough for people to value the water but it should be reasonable
- The project should be implemented as it is designed. The implementation of the sewerage project differed from its design.
- The project duration for the sewerage project lasted longer than planned and lots of funds were wasted on project management cost.
- This project should try to enable recycling of the waste water.
- The project needs to be sustainable and fund the operation of the implemented system.
- The production capacity of the desalination plant needs to be increased so that there is enough water for all household purposes throughout the year.
- The system will be more sustainable if the water is provided for commercial purposes. For example, if water is sold at the harbor, the fishing boats will buy and maybe the neighboring islands might buy.

Notes from Community Consultation in GDh. Gadhdhoo

Date: 8th July 2012 (9.00pm to 10.30 pm)

Venue: GDH Atoll Education Center

Community Consultation Team: Mr. GovindarajanSarvanan (UNOPS), Mr. Abdulla Waheed (MEE), Mr. Mohamed Rameez (MEE), Mr. Hamdhoon Mohamed (MEE)

1. **Affordability of desalinated water.**

- Community enquired regarding the tariff which would be applicable for the piped water network.
- Community suggested that the tariff should be devised in such a way that desalinated water should be affordable for all the users.
- Community suggested that the demand for desalinated piped water network will be less during the rainy season and questioned the viability of the piped water network during the mentioned period.
- Some areas of the island have more demand for the piped water than the other areas. These are the areas with polluted groundwater.
- Community highlighted that the island desperately needs a sewerage system.

2. **Willingness to pay.**

- Community is willing to pay but there is not much demand for piped water during the rainy season.
- People from some part of the island where groundwater is polluted, will be willing to pay for the piped water all throughout the year.
- If the tariff is similar to Male' or higher than Male' tariff rate, community would not be able to pay due to financial constraints.

3. **Operation of Maintenance of the system.**

- Community is very much concerned about the operation and maintenance of the piped water network.
- According to community the existing desalination plant is not properly maintained and the operation is ineffective.
- Community also highlighted the importance of appointing trained personnel for the operation and maintenance of the system.
- Community suggested the operation and maintenance should be given to a company with technical expertise and financially stable in order to run the system smoothly.
- Community suggested the importance of the lab facilities to ensure that quality of water is optimum.

4. **Suggestions and ideas**

    - Community recommended including the newly reclaimed area of the island in the project since the land will be allocated for the house plots in a near future.
    - Community recommended considering rainwater catchment area of the houses in the main road to harvest rainwater, so that the load on the desalination plant will be reduced.
    - Community wanted to employ the residents of GDH. Gadhdhoo for the operation and maintenance purpose.

- Community recommended conducting discussions with the ministry and the council regarding the no. of connections or the land plots which will be provided with meter.
- Community recommended including division of each household at present and near future, in order to access to all.
- Lands for RO plant and water tanks were sent to concern ministry for approval.

Notes from Community Consultation in HA.Ihavandhoo

Date: 3rd July 2012

Venue: Secretariat council of HA. Ihavandhoo

Community Consultation Team: Mr. Govindarajan Sarvanan (UNOPS), Mr. Abdulla Waheed (MEE), Mr. Mohamed Rameez (MEE), Mr. Hamdhoon Mohamed (MEE)

1. **Source of Brine for the desalination plant.**

- Community enquired regarding the source of brine for desalination plant will be taken.
- Team told that the source will be a borehole which will be 30 meter (approximately 100 Feet) in depth and will be situated near the beach.
- The main concern of the community was whether borehole will affect the fresh water lens of the island. They suggested that proper investigations should be carried out regarding the affects of borehole on the fresh water lens of the island.
- Participant from UNOPS highlighted that water tests and investigations have been done and they are willing to consider other option like sea for the source of brine if it fit to the reasonable maintenance cost.

2. **Willingness to pay and quality of the water supplied.**

- Community is willing to pay any amount but the quality of the water must be the best.
- Community highlighted that they do not appreciate the quality of desalinated water available in Male' piped water network.
- Parameters like hardness of water and high chlorine content will affect the health of users.
- Community suggested carrying out investigations on the health impacts on consumers by desalinated water from the proposed system.
- The water tariffs should be formulated in such a way that water bills should not be a huge burden to the community.

3. **Construction phase of the project**

- Community suggested speeding up the design stage and starting the construction stage as soon as possible.
- They were asking what the proposed date to start the construction stage is.
- Participant from UNOPS estimated the beginning of 2013 will be the start of construction phase.
- Community asked whether the fee will be taken for each house connection (meter) at the end of construction phase. Team response was that no charge will be taken for the initial connections at the end of the construction phase.The operator of the system may take fee for any future connections.
- Community recommended conducting discussions with the ministry and the council regarding the no. of connections or the land plots which will be provided with meter. '
- The proposed land for the main storage tanks accommodate trees which belong to individuals of the community. So the procedure for the compensation should be discussed with the ministry and the council of HA. Ihavandhoo.

4. **Suggestions and ideas**
    - Community recommended making clear guidelines regarding the following issues;
      The position of the meter inside the residential premises
      Compensation for any damage caused during construction phase to existing electricity, phone or media cables.
    - Furthermore, team suggested including a representative from the power house and phone and cable companies during the excavation process.
    - Construct over head tanks to prevent damages caused by natural disasters like tsunami and tidal waves.
    - Since most of the islands face shortage of water during dry period, project shall provide a kiosk water booth.
    - HA. Ihavandhoo has very much demand to supply water fishing vessels so kiosk water will be very much commercially viable in the harbor.
    - Kiosk water booth shall be provided with security features like locks.
    - Include one kiosk water booth in residential area so that poor people can have access to safe drinking water.
    - Treated water storage capacity for 3 weeks.
    - Highlighted RO plant area has been confirmed by participants.
    - 110 m3 per day RO plant is not enough for their commercial purpose and produce income to maintain system.
    - Disposal Location of untreated water from RO plant to ground or to sea.
    - Existing power house capacity is not enough to include water system consumption.
    - New cable from power house to RO plant to avoid voltage fluctuation.

ANNEX 5

Terms of Reference

Willingness to Pay Survey

GENERAL BACKGROUND

Freshwater resources are scarce in the Maldives and climate change-induced decline of freshwater resources is affecting the entire population. As surface freshwater is generally lacking throughout the country (with the exception of a limited number of brackish water swampy areas in some of the islands), the key problems pertaining to freshwater security relate to the management of increasingly saline groundwater and increasingly variable rainfall patterns.

Roof top harvested rainwater is the main source of drinking water available on islands across Maldives. However, due to limited storage capacity within house plots, householders can collect and store only a small quantity of water. In dry periods, many householders experience a shortage of drinking water, which is due to shifting weather patterns and prolonged dry periods. In such instances, the government is called upon to transport potable water to the affected islands.

Apart from water scarcity in dry periods, another major concern associated with rooftop harvested rainwater on islands is the absence of means to check water quality and employ biological or chemical water security measures.

Over the last few years the National Disaster Management Center has transported potable water to many islands facing acute water shortages due to prolonged dry periods costing over US$ 2 million every year.

Groundwater is a scarce resource in Maldives, due to the hydrogeology of the country. Many freshwater aquifers are already stressed from over-extraction and face the risk of total depletion. Saltwater intrusion into the freshwater lens caused by climate change-induced effects of sea level rise and flooding during extreme weather events is affecting the quality of life in the islands, as people depend on groundwater for washing, bathing and other non-potable uses. Saltwater intrusion is also affecting soil and vegetation, causing impacts on agriculture and terrestrial ecosystems. In addition, groundwater is stressed from the effects of flood-induced pollution, especially spillovers of septic tanks and spillage of human, animal and household waste during periods of heavy rainfall and inundation.

The Government of Maldives is undertaking a project with the assistance of the Adaptation Fund, UNDP and UNOPS a project that will increase the resilience of freshwater resources through an integrated management of ground- and freshwater resources in the islands of Mahibadhoo (Alif Dhaalu Atoll), Ihavandhoo (Haa Alif Atoll) and Gadhdhoo (Gaafu Dhal Atoll).

Through a targeted mix of the following investments, the project will address the effects of variable rainfall, extreme weather events, salinization and pollution of aquifers:

- Establishment of a sustainable freshwater supply system that incorporates and integrates rainwater harvesting and desalination technology;
- Improvement of groundwater quality through artificial groundwater recharge and better integration between freshwater and wastewater management;
- Increasing community participation in the development, allocation and monitoring of freshwater use in a changing climate;
- Replication and up scaling of climate-resilient freshwater management

OBJECTIVES OF THE ASSIGNMENT

The objectives of the assignment are to:

a) Evaluate the willingness to pay for improved water and sanitation services (WSS) of communities on ADh. Mahibadhoo, HA. Ihavandhoo and GDh. Gadhdhoo islands; and
b) delineate options for the operation and maintenance of integrated water management systems on each target island (including tariff structures and the roles/responsibilities of atoll councils, island councils, utility companies and/or the private sector in sustaining, operating and maintaining the new investments).
c) Build capacity - enable atoll councils, island councils utility companies and/or private sector in conducting willingness to pay surveys through training workshops

SCOPE OF WORK

OUTPUTS

a) Inception Note;

b) Detailed Community Consultation Survey Report

c) Detailed Options Feasibility Report

d) An evidence based assessment report of willingness to pay for an improved water and sanitation services for the communities of ADh Mahibadhoo, HA Ihavandhoo and GDh Gadhdhoo that is useful and basis for long-term maintenance and management of the WSS

(this report may include i) current situation with regard to sources of drinking water including availability and scarcity, costs incurred to buy or use water for drinking and other purposes by households, islands and atolls ii) reasons for willing to pay for the improved WSS in terms of individual/household incomes, health issues and awareness of importance of safe drinking water and sanitation within the communities iii) preconditions that households and the communities may have for willingness to pay for the WSS iv) 5-10 year long-term forecasts on WSS improvement and maintenance costs and willingness of the communities to pay for the WSS v) traditional norms within the communities for management of drinking and waste water including wiliness to contribute establishment and maintenance of public water storage facilities

e) Detail description of options for the operation and maintenance of integrated water management systems for each target island (this may include i) options for operation and management of WSS in case of natural or man-made disasters and emergencies ii) the options may include WSS management system that incorporate traditional norms that are appropriate for the communities)

f) Relevant training materials to conduct training workshops for atoll councils, island councils, utility companies and/or private sector on willingness to pay for improved WSS system

ACTIVITIES

The scope of work for the consultancy will include, but not necessarily be limited to, the following activities:

Regarding Inception Note

a) Study and review relevant background materials and hold initial discussions with project stakeholders;

b) Write-up an Inception Note comprising:

   i. the successful Contractors understanding of the consultancy and associated tasks;
   ii. the proposed detailed technical approach;
   iii. the proposed detailed work plan/timeline;
   iv. identification of issues crucial to the viability of the consultancy; and
   v. detailed comments on this TOR. Subsequently, if required and approved by UNDP Maldives, the TOR can be adjusted in response to the Inception Note.

c) Submit Inception Note to UNDP Maldives for approval or revision.

DETAILED COMMUNITY CONSULTATION SURVEY REPORT

a) Undertake pre-survey data-collection and analysis, including but not limited to:

   i. demographic information including information available in the most recent Census (2006).
   ii. information about the islands available from the MHE and MED
   iii. previous projects, ongoing and planned projects

b) Undertake pre-survey stakeholder engagement and information gathering, including but not limited to:

   i. Meeting with local officials and community leaders to determine what the relationship is between key stakeholders, such as: the water service providers (formal and informal), government water departments, the local council water department, community and water user groups and others involved in the management of water services?
   ii. Meeting with local officials and community leaders to understand: experiences of previous projects; details of problems with the main water source(s); likely options or solution; and the cultural and practical reasons and why certain options might be preferred or not viable.
   iii. Understanding the current prices (if any) of water from different sources.

iv. Determining if any plans are being initiated to change the management of the services in a substantial manner, including distributing responsibilities for the management and co-ordination of services.
v. Broadly defining and testing options for improved WSS on the respective target islands.

c) Determine the sampling methodology and sample size.

d) Develop the Contingent Valuation (CV) scenario, including but not limited to:

i. Define the improved WSS options being offered to the respondent.
ii. Cost the options.
iii. Decide how the options will be offered to the respondent.
iv. Choose a realistic payment method which sets out clearly how the respondent is being asked to pay for the improved/new services.
v. Choose elicitation method, paying particular attention to defining a method that reduces the risk of bias occurring.
vi. Undertaking the above steps in consultation with relevant stakeholders and UNDP Maldives to ensure institutional, political, practical, social, cultural and gender factors and context are incorporated appropriately.

e) Complete household and CV survey questions, including socio-economic question.

f) Select and train enumerators and field managers and pilot test survey, including but not limited to:

i. Both classroom and in-the-field training.
ii. Testing of the sampling strategy.
iii. Pilot testing of survey in the field.
iv. Refinement of survey based on outcomes of above steps and further consultation with relevant stakeholders and UNDP Maldives.

g) Implement the survey and provide updates to UNDP Maldives on survey progress.

h) Undertake data entry, data quality checks and analysis.

i) Complete a detailed survey report including but not limited to:

i. An outline of the survey approach and rationale for approach.
ii. A discussion of any problems or biases encountered and any surveys/results excluded from final aggregation of data.
iii. The expression of both CV and socio-economic results in an easy to understand and interpret format, including graphical displays.
iv. Basic interpretation of data including (if any) evident causation, relationships and/or correlation between socio-economic results and CV results.

DETAILED OPTIONS FEASIBILITY REPORT

In general:

a) Describe and assess in detail the current WSS situation on each target island and the technical, economical, financial, institutional and environmental feasibility of carrying out the option(s) for WSS improvement as detailed in the CV survey;

b) Consult during the process as appropriate with major stakeholders;

c) Ensure that all interventions proposed are consistent with the Government of Maldives Policy;

d) Where appropriate use, build on and update the information available in the attached project document (Annex 2).

Specifically:

e) Briefly describe background and immediate objectives.

f) Briefly describe the socio-economic context. The description might include but not necessarily be limited to:

   i. geography, climate and main economic activities;
   ii. structure of local administration overall and more specifically how it relates to WSS services;
   iii. size of population, population density;
   iv. average income per capita and income distribution;
   v. occupational distribution;
   vi. willingness of the concerned project beneficiaries to pay for the services; and
   vii. relevant forecasts (e.g. extension of service area(s); population/target group(s); per capita income, etc.).

g) Briefly describe the structure of the water sector. The description might include but not necessarily be limited to

   i. the relevant public authorities for the sector at national and local levels and their roles and responsibilities;
   ii. government policy and plans for the sector, objectives, strategies, programmes and activities;
   iii. national and local budgets for the sector;
   iv. overall legislative framework for the sector;
   v. the organisation of the sector itself, ownership within the sector, degree of organisational and financial autonomy of the power supply entities;
   vi. sector coverage at national and local levels; and
   vii. national standards and/or aspirations for the sector.

h) Briefly undertake problem analysis. The analysis might include but not necessarily be limited to the following:

   i. the present WSS situation;
   ii. present and potential demand for WSS services; and

iii. short, medium and long term problems to be addressed (legislative, institutional, human resource, technical, environmental, financial, security of supply, etc.).

i) Describe and assess WSS demand as identified in the CV survey. Based on this assessment delineate options for the operation and maintenance of integrated water management systems (as described in the CV survey) on each target island, including but not limited to:

   i. Options for tariff structures and the roles/responsibilities of atoll councils, island councils, utility companies and/or the private sector in sustaining, operating and maintaining the new investments; and
   ii. The process, benefits and costs of implementing options.

UNOPS

Technical Project Manager

Project: Increasing climate resilience through an Integrated Water Resource Management Programme in HA. Ihavandhoo, ADh. Mahibadhoo and GDh. Gadhdhoo Islands in Maldives. ATLAS Project No: 00079220.

Duty station: UNOPS' Maldives Project Centre (MVPC) in Male with frequent travel to the Sri Lankan Operations Centre (LKOC).

Section/Unit: UNOPS' Maldives Project Centre (MVPC)

Contract/Level : International Individual Contractor Agreement IICA-2.

Duration: 15 Months (01/Feb/2012 through 30/Apr/2013)

Supervisor: Senior Programme Manager (SPM)- LKOC & Manager- MVPC.

1. General Background of Project / Assignment

The primary problem addressed by this project is a significant, climate change-induced decline of freshwater security that is affecting vulnerable communities in Maldives. As surface freshwater is generally lacking throughout the country, the key problems pertaining to long-term freshwater security relate to the management of increasingly variable rainwater resources and increasingly saline and polluted groundwater.

The Government of the Republic of Maldives through an extensive application process to the Adaptation Fund was granted to about USD 8.8million to enhance the resilience and adaptation of three local vulnerable islands in relation to climate change. This project has been supported from its beginning by UNOPS to the Ministry of Housing & Environment with the technical assistances by UNDP for the formal application to the Adaptation Fund (AF).

The proposed project will demonstrate climate-smart freshwater management in the Maldivian context and will establish integrated and resilient water supply systems on the densely populated islands of HA. Ihavandhoo, ADh. Mahibadhoo and GDh. Gadhdhoo, with a view on country-wide replication and up scaling.

Through the rollout of an integrated water resource management programme in the above islands, the project will ensure consistent, safe and equitable access of all island communities to safe freshwater in a changing climate. Through a targeted mix of the following investments, the project will address the effects of variable rainfall, extreme weather events, salination and pollution of aquifers:

Under the Component-1 of the project activities; *Establishment of a sustainable freshwater supply system that incorporates desalination and rainwater harvesting technology* and ; *Establishment of a sustainable groundwater management system that incorporates groundwater recharge and wastewater management technology,* UNOPS is expected to implement the project with the following outputs;

- Output 1.1:Artificial groundwater recharge systems established to protect groundwater resources from salinization and improve aquifer yields in dry seasons.

- Output 1.2: Existing rainwater harvesting schemes are redesigned, interconnected and structurally improved to buffer climatic extremes and ensure equal water supply for all households during dry periods.

- Output 1.3: Production and distribution system for desalinated water supply established to supplement the improved rainwater harvesting during dry season.

- Output 1.4: Existing wastewater management systems redesigned and improved to ensure sufficient quantities of safe groundwater

UNOPS is seeking a highly qualified and motivated individual to act as the Technical Project Manager to plan, implement and handover the above activities on behalf of its partners and clients.

2. Purpose and Scope of Assignment

The Technical Project Manager is responsible for ensuring that the project produces the required products within specified tolerances of time, cost, quality, scope, risk and benefits, and for the project to produce the results required to achieve the benefits as defined.

The Technical Project Manager works under the technical supervision and direction of the Senior Programme Manager (SPM) and the MVPC Manager. She/He will head the Project Implementation team based on the Ministry of Housing and Environment (MoHE) and directly supervise the Project's Technical Design, Implementation, Management and Support staff both in MVPC and LKOC offices.
In accordance with established UNOPS policies, procedures and practices, the Technical Project Manager performs the following tasks:

Stakeholder Coordination/Management

- Have sound working relationships with all key project stakeholders, including The Government of the Maldives represented by MoHE, UNDP Maldives, Local community and the respective authorities of the three islands including Island Councils and Local Government Authority.
- Manage communications/information and ensure stakeholders are aware of project activities, progress, exceptions and are in a position to accept handover of products; responsible for reporting to the MoHE as defined in the project agreement and plans;
- Schedules, participates in all project related meetings and assumes its secretarial functions.

Personnel Management

- Manage different functional teams of the project; Design, Implementation, Support and Admin as per their role in the project.
- Lead, motivate and supervise a technical and admin support team of national personnel with a focus on efficiency, effectiveness and job satisfaction;
- Select, recruit and train project team and as required by project/stage/phase plans; produces terms of reference/job descriptions of new project team members and short term technical consultants/experts; coordinates recruitment processes and participate as required; ensure regular performance reviews; develops training plans as required.
- Implementation of knowledge management practices.

- Ensure safety and security for all personnel comply with UNDSS standards.

3. Monitoring and Progress Controls

- Select, Manage and make sure to receive the technical design component of the project through an appropriate and efficient design team consisting of Structural, Water, Mechanical and Electrical Engineers.
- Manage implementation of results as described in the project's documents, ensuring their achievement on time and within budget.
- Elaboration of analytical reports (e.g. analysis methodologies, diagnosis) and relevant general documents as required.
- Responsible for managing daily project activities.
- Produce detailed plans for each project phase/stage, including relevant product descriptions and flows, resource mobilization schedules, procurement/HR plans, etc. and report on progress on a regular basis as defined. Ensures adequate prioritization of critical project tasks; Prepare End Stage/Phase reports, Exception reports, End Project/Handover and Lessons Learned reports as required.
- Manage production of work packages and work products as necessary to produce results and as per approved stage/phase plan, thereby taking responsibility for overall progress and use of resources and initiating corrective action where necessary. Manage and review product quality and ensure products are accepted; Prepare highlight reports as required.
- Identify report on and manage risks so that maximum benefit to clients and stakeholders is achieved; ensure up-to-date risk logs.
- Coordinate and prepare for missions by UNDP and MoHE experts and consultants in support of the results and products as defined in the project and stage/phase plans.
- Ensure quality project support services are provided in a timely manner, in line with approved project and stage/phase plans and conform to UNOPS policies, practices and procedures. Maintains proper records, incl. Blue File, procurement, HR and Finance files as required by UNOPS practices.
- Manage project budgets, cash flows and contracts/obligations; prepares any necessary budget revisions; Ensure expenditures are in compliance with project agreements and UNOPS' Financial Regulations and Rules (FRRs); Ensure payments to contractors and personnel are effected on time.
- Manage engineering contracts from call of proposals/tenders/quotations, award, agreements, implement work packages, monitor, control, verify & approve payments, endorse work completion and attend any contractual disputes. Coordinate and manage contractors of international & local origins who will be engaged simultaneously where their contracts will be managed under the FIDIC terms and conditions of contract.
- Manages procurement and engagement actions for the project in line with specific procurement and engagement plans as per project and/or stage/phase plans, including drafting of tender documents incl. scope of services and/or technical specifications, review of proposals, quotations and/or bids; drafting of contracts and contract monitoring and administration.

4. Final Product

- Produce and approve the required technical design documents through the design team; drawings, Bill of Quantities, Method Statements, reports, etc, prior to the implementation of the works in field.
- Select eligible contractors and award engineering work contracts as per the work

packages.

- Manage the above contracts through the assigned and available resources.
- Confirm the above said engineering works been completedthrough the contractors and endorse completion reports.
- Complete entire project activities and execute UNOPS project completion procedures.
- Handover all matters related to the project completion to UNOPS (MVPC & LKOC), UNDP and MoHE management.

5. Qualifications and Experience

a. Education *(Level and area of required and/or preferred education)*

Advanced University/Master degree in Civil/Environmental Engineering or Water & Sanitation Management related field. First university degree in combination with 2 additional years of relevant work experience may be considered in lieu of the Masters Degree requirement. Sufficient years of practical experience combined with technical diplomas may be accepted in lieu of university degree.

b. Work Experience

General professional experience

- At least 10 years of relevant working experience.
- Water/ Sewage/Waste Water Treatment, Water distribution, Desalination, Pipe network experience in public or/and private sector;

Specific professional experience

- Proven experience in managing/coordinating successful and complex projects that are relevant to the Water & Sanitation projects.
- Experience with managing full life cycle of Water supply, Waste water, Desalination, Pipe born water supply development and implementation projects.
- Experience with designing and implementing Water Supply project management procedures.
- International project experience in Water & Sanitation projects would be an asset.
- International / Local experience in managing work contracts hiring multiple contractors and suppliers under a single project / programme. Special experience in managing contractual disputes under FIDIC terms and conditions of contract.
- Experience with PRINCE2 or equivalent project management methodology/approach is highly desirable.

c. Key Competencies

Management/technical competencies

- Excellent and proven managerial, organizational, leadership and teamwork skills;
- Meets with UN Managerial competency requirements;
- Ability to professionally manage and lead a large team and to coordinate with technical counterparts and national/local authorities/institutions;
- Sound technical knowledge of Civil / Environmental Engineering Record and/or Water & Sanitation Systems is a must.
- Good communications skills including ability to write technical reports and prepare and present concise reports in English.
- Knowledge of the UN system and familiarity with UNOPS procedures is an advantage.

- Certification in Prince2 or Project Management Professional (PMP) methodologies is desirable.

General

- Fluency in English. Working knowledge of local language Dhivehi would be desirable.
- Proficient computer skills especially Microsoft applications and Structural and Water Supply design software.
- Seeks and applies knowledge, information, and best practices from within and outside of UNOPS.

UNOPS

Technical Project Officer

Project: Increasing climate resilience through an Integrated Water Resource Management Programme in HA. Ihavandhoo, ADH. Mahibadhoo and GDh. Gadhdhoo Islands in Maldives. ATLAS Project No: 00079220.

Duty station: UNOPS' Maldives Project Centre (MVPC) in Male with frequent travel to the Islands of HA. Ihavandhoo, ADh. Mahibadhoo and GDh. Gadhdhoo.

Section/Unit: UNOPS' Maldives Project Centre (MVPC)

Contract/Level : Local Individual Contractor Agreement LICA-8.

Duration: 12 Months (01/May/2012 through 30/Apr/2013)

Supervisor: Technical Project Manager - MVPC.

1. General Background of Project / Assignment

The primary problem addressed by this project is a significant, climate change-induced decline of freshwater security that is affecting vulnerable communities in Maldives. As surface freshwater is generally lacking throughout the country, the key problems pertaining to long-term freshwater security relate to the management of increasingly variable rainwater resources and increasingly saline and polluted groundwater.

The Government of the Republic of Maldives through an extensive application process to the Adaptation Fund was granted to about USD 8.8million to enhance the resilience and adaptation of three local vulnerable islands in relation to climate change. This project has been supported from its beginning by UNOPS to the Ministry of Housing & Environment with the technical assistances by UNDP for the formal application to the Adaptation Fund (AF).

The proposed project will demonstrate climate-smart freshwater management in the Maldivian context and will establish integrated and resilient water supply systems on the densely populated islands of HA. Ihavandhoo, ADh. Mahibadhoo and GDh. Gadhdhoo, with a view on country-wide replication and up scaling.

Through the rollout of an integrated water resource management programme in the above islands, the project will ensure consistent, safe and equitable access of all island communities to safe freshwater in a changing climate. Through a targeted mix of the following investments, the project will address the effects of variable rainfall, extreme weather events, salination and pollution of aquifers:

Under the Component-1 of the project activities; *Establishment of a sustainable freshwater supply system that incorporates desalination and rainwater harvesting technology* and ; *Establishment of a sustainable groundwater management system that incorporates groundwater recharge and wastewater management technology,* UNOPS is expected to implement the project with the following outputs;

- Output 1.1:Artificial groundwater recharge systems established to protect groundwater resources from salinization and improve aquifer yields in dry seasons.

- Output 1.2: Existing rainwater harvesting schemes are redesigned, interconnected and structurally improved to buffer climatic extremes and ensure equal water supply for all households during dry periods.

- Output 1.3: Production and distribution system for desalinated water supply established to supplement the improved rainwater harvesting during dry season.

- Output 1.4: Existing wastewater management systems redesigned and improved to ensure sufficient quantities of safe groundwater

UNOPS is seeking a highly qualified and motivated individual to act as the Technical Project officer to assist the Technical Project Manager in planning, implementing and handing over the above activities on behalf of its partners and clients.

2. Purpose and Scope of Assignment

Under the direct supervision of the Technical Project Manager, the Technical Project Officer is responsible for ensuring that the project produces the required products within specified tolerances of time, cost, quality, scope, risk and benefits, and for the project to produce the results required to achieve the benefits as defined.

She/ He will assist the Technical Project Manger in heading the Project Implementation team based in the UNOPS MVPC and directly supervise the Project's Implementation, Management and Support staff in MVPC.
In accordance with established UNOPS policies, procedures and practices, the Technical Project Officer performs the following tasks:

<u>Stakeholder Coordination/Management</u>

- Have sound working relationships with all key project stakeholders, including The Government of the Maldives represented by MoHE, UNDP Maldives, Local community and the respective authorities of the three islands including Island Councils and Local Government Authority.
- Manage communications/information and ensure stakeholders are aware of project activities, progress, exceptions and are in a position to accept handover of products; responsible for reporting to the MoHE as defined in the project agreement and plans;
- Schedules, participates in all projects related meetings and assumes its secretarial functions.

<u>Personnel Management</u>

- Manage different functional teams of the project; Implementation, Support and Admin as per their role in the project.
- Lead, motivate and supervise a technical and admin support team of national personnel with a focus on efficiency, effectiveness and job satisfaction;
- Implementation of knowledge management practices.
- Ensure safety and security for all personnel comply with UNDSS standards.

3. Monitoring and Progress Controls

- Manage implementation of results as described in the project's documents, ensuring their achievement on time and within budget.

- Elaboration of analytical reports (e.g. analysis methodologies, diagnosis) and relevant general documents as required.
- Responsible for managing daily project activities as part of assisting the Technical Project Manager in his daily duties.
- Produce detailed plans for each project phase/stage, including relevant product descriptions and flows, resource mobilization schedules, procurement/HR plans, etc. and report on progress on a regular basis as defined. Ensures adequate prioritization of critical project tasks; Prepare End Stage/Phase reports, Exception reports, End Project/Handover and Lessons Learned reports as required.
- Manage production of work packages and work products as necessary to produce results and as per approved stage/phase plan, thereby taking responsibility for overall progress and use of resources and initiating corrective action where necessary. Manage and review product quality and ensure products are accepted; Prepare highlight reports as required.
- Identifyreport and manage risks so that maximum benefit to clients and stakeholders is achieved; ensure up-to-date risk logs.
- Assist the Technical Project Manger in Coordinating and preparing missions by UNDP and MoHE experts and consultants in support of the results and products as defined in the project and stage/phase plans.
- Ensure quality project support services are provided in a timely manner, in line with approved project and stage/phase plans and conform to UNOPS policies, practices and procedures. Maintains proper records, incl. Blue File, procurement, and HR and Finance files as required by UNOPS practices.
- Assist the Technical Project Manager in managing project budgets, cash flows and contracts/obligations; prepares any necessary budget revisions; Ensure expenditures are in compliance with project agreements and UNOPS' Financial Regulations and Rules (FRRs); Ensure payments to contractors and personnel are effected on time.
- Manage engineering contracts from call of proposals/tenders/quotations, award, agreements, implement work packages, monitor, control, verify & approve payments, endorse work completion and attend any contractual disputes. Coordinate and manage contractors of international & local origins who will be engaged simultaneously where their contracts will be managed under the FIDIC terms and conditions of contract.
- Manages procurement and engagement actions for the project in line with specific procurement and engagement plans as per project and/or stage/phase plans, including drafting of tender documents incl. scope of services and/or technical specifications, review of proposals, quotations and/or bids; drafting of contracts and contract monitoring and administration.

4. Final Product

- Assist the Technical project Manager in selecting eligible contractors and awarding engineering work contracts as per the work packages.
- Manage the above contracts through the assigned and available resources.
- Confirm the above said engineering works been completed through the contractors and endorse completion reports.
- Complete entire project activities and execute UNOPS project completion procedures.
- Handover all matters related to the project completion to UNOPS (MVPC), UNDP and MoHE management.

5. Qualifications and Experience

a. Education *(Level and area of required and/or preferred education)*:
Advanced University/Master degree in Civil/Environmental Engineering or Water & Sanitation Management related field. First university degree in combination with 2 additional years of relevant work experience may be considered in lieu of the Masters Degree requirement. Sufficient years of practical experience combined with technical diplomas may be accepted in lieu of university degree.

b. Work Experience *(List number of years / area of required work experience. Clearly distinguish between required experience and experience which could be an asset.)*:

General professional experience

- At least 7 years of relevant working experience.
- Water/ Sewage/Waste Water Treatment, Water distribution, Desalination, Pipe network experience in public or/and private sector;

Specific professional experience

- Proven experience in managing/coordinating successful and complex projects that are relevant to the Water & Sanitation projects.
- Experience with managing full life cycle of Water supply, Waste water, Desalination, Pipe born water supply development and implementation projects.
- Experience with designing and implementing Water Supply project management procedures.
- International project experience in Water & Sanitation projects would be an asset.
- International / Local experience in managing work contracts hiring multiple contractors and suppliers under a single project / programme. Special experience in managing contractual disputes under FIDIC terms and conditions of contract.
- Experience with PRINCE2 or equivalent project management methodology/approach is highly desirable.

c. Key Competencies *(Technical knowledge, managerial competencies or other personal competencies relevant to the performance of the assignment)*:

Management/technical competencies

- Excellent and proven managerial, organizational, leadership and teamwork skills;
- Meets with UN Managerial competency requirements;
- Ability to professionally manage and lead a large team and to coordinate with technical counterparts and national/local authorities/institutions;
- Sound technical knowledge of Civil / Environmental Engineering Record and/or Water & Sanitation Systems is a must.
- Good communications skills including ability to write technical reports and prepare and present concise reports in English.
- Knowledge of the UN system and familiarity with UNOPS procedures is an advantage.
- Certification in Prince2 or Project Management Professional (PMP) methodologies is desirable.

General

- Fluency in English. Working knowledge of local language Dhivehi would be desirable.
- Proficient computer skills especially Microsoft applications and Structural and Water Supply design software.

- Seeks and applies knowledge, information, and best practices from within and outside of UNOPS.
- This post is open only to the Local eligible professionals or those who have the required license to work in Maldives.

UNOPS

Island Residential Engineers – 03 Nos.

Project: Increasing climate resilience through an Integrated Water Resource Management Programme in HA. Ihavandhoo, ADh. Mahibadhoo and GDh. Gadhdhoo Islands in Maldives. ATLAS Project No: 00079220.

Duty station: Islands of HA. Ihavandhoo, ADh. Mahibadhoo and GDh. Gadhdhoo with frequent travelling to UNOPS' Maldives Project Centre (MVPC) in Male.

Section/Unit: UNOPS' Maldives Project Centre (MVPC)

Contract/Level : Local Individual Contractor Agreement LICA-6.

Duration: 12 Months (01/Jul/2012 through 30/Jun/2013)

Supervisor: Technical Project Manager - MVPC.

1. General Background of Project / Assignment

The primary problem addressed by this project is a significant, climate change-induced decline of freshwater security that is affecting vulnerable communities in Maldives. As surface freshwater is generally lacking throughout the country, the key problems pertaining to long-term freshwater security relate to the management of increasingly variable rainwater resources and increasingly saline and polluted groundwater.

The Government of the Republic of Maldives through an extensive application process to the Adaptation Fund was granted to about USD 8.8million to enhance the resilience and adaptation of three local vulnerable islands in relation to climate change. This project has been supported from its beginning by UNOPS to the Ministry of Housing & Environment (MHE) with the technical assistances by UNDP for the formal application to the Adaptation Fund (AF).

The proposed project will demonstrate climate-smart freshwater management in the Maldivian context and will establish integrated and resilient water supply systems on the densely populated islands of HA. Ihavandhoo, ADh. Mahibadhoo and GDh. Gadhdhoo, with a view on country-wide replication and up scaling.

Through the rollout of an integrated water resource management programme in the above islands, the project will ensure consistent, safe and equitable access of all island communities to safe freshwater in a changing climate. Through a targeted mix of the following investments, the project will address the effects of variable rainfall, extreme weather events, salination and pollution of aquifers.

Under the Component-1 of the project activities; *Establishment of a sustainable freshwater supply system that incorporates desalination and rainwater harvesting technology* and ; *Establishment of a sustainable groundwater management system that incorporates groundwater recharge and wastewater management technology,* UNOPS is expected to implement the project with the following outputs;

- Output 1.1:Artificial groundwater recharge systems established to protect groundwater resources from salinization and improve aquifer yields in dry seasons.

- Output 1.2: Existing rainwater harvesting schemes are redesigned, interconnected and structurally improved to buffer climatic extremes and ensure equal water supply for all households during dry periods.

- Output 1.3: Production and distribution system for desalinated water supply established to supplement the improved rainwater harvesting during dry season.

- Output 1.4: Existing wastewater management systems redesigned and improved to ensure sufficient quantities of safe groundwater

UNOPS is seeking highly qualified and motivated individuals to act as Island Residential Engineers in the respective three locations and to assist the Technical Project Manager in planning, implementing and handing over the above activities on behalf of its partners and clients.

2. Purpose and Scope of Assignment

Under the direct supervision of the Technical Project Manager along with the Assistance of the Technical Project Officer, each of the Island Residential Engineer will be responsible for ensuring that the project produces the required products within specified tolerances of time, cost, quality, scope, risk and benefits, and for the project to produce the results required to achieve the benefits as defined.

She/ He will assist the Technical Project Manger in heading the Project Implementation team based in the UNOPS MVPC and directly supervise the Project's Implementation works in each of the Islands under Contracted works and work along with the other UNOPS Residential staff such as Technical & Logistic Assistants, Boat Operators, etc.
In accordance with established UNOPS policies, procedures and practices, the Island Residential Engineers perform the following tasks:

- Monitoring quality control and quality assurance of contractors' daily activities on site to ensure conformance of minimum nominated standards and specifications.
- Identification of any technical issues based on site conditions and resolve with consultation of the Technical Project Manager / Technical Project Officer.
- Closely monitor Contractors' performance in the field in accordance with their proposed construction methodology, programming and productivity norms.
- Provide necessary technical and operational assistance and field activities' monitoring guidelines to UNOPS Island Technical Assistants and other related staff on regular basis.
- Perform necessary field tests to confirm realization of required minimum expected standard and carry out relevant alternatives in the event of failures.
- Witness critical hold point activities and provide input to the Technical Project Manager / Project Officer for release of hold points.
- Carry out field measurements for the executed works by the contractors, checking of monthly claims and all other matters as when instructed by the Technical Project Manger.
- Record and maintain log books covering all daily site activities including variations from approved drawings, etc.
- Report daily to the Technical Project Manager / Project Officer on progress of works in comparison with the programme including measures taken to rectify any deficiencies.
- Represent UNOPS in the island community meetings and liaise with the community leaders and updating them on the UNOPS' work progress and capture all of their feedback on the UNOPS' activities and works.

- Have a continued corporation with the MHE & UNDP representative of the Islands and cordially work with them as a team.
- Ensure safety and security in the sites as per the UNDSS' Health
- Any other assignments/ responsibilities delegated by the Technical Project Manager.

3. Monitoring and Progress Controls

- Record and maintain log books covering all daily activities including variations from approved drawings, etc.
- Carrying out field measurements for the executed works, checking of monthly claims and all other matters as and when instructed by the Technical Project Manager.
- Maintain UNOPS site/island offices with all required records and frequent reporting of all matters to the UNOPS MVPC office.

4. Final Product

- This position holds responsibility from the initiation of the construction activities to the final handing over of the site to the relevant beneficiaries; the island communities and the MHE, and would include provision of technical assistance to the UNOPS Technical Project Manager for achieving project completion within the time frame stipulated in the contract.

5. Qualifications and Experience

a. Education *(Level and area of required and/or preferred education)*:
University degree in Civil/ Environmental Engineering or Water & Sanitation Management related field. Sufficient years of practical experience combined with technical diplomas may be accepted in lieu of university degree.

b. Work Experience *(List number of years / area of required work experience. Clearly distinguish between required experience and experience which could be an asset.)*:

General professional experience

- At least 6 years of relevant working experience.
- Water/ Sewage/Waste Water Treatment, Water distribution, Desalination, Pipe network experience in public or/and private sector;

Specific professional experience

- Proven experience in managing/coordinating successful and complex projects that are relevant to the Water & Sanitation projects.
- Experience with managing full life cycle of Water supply, Waste water, Desalination, Pipe born water supply development and implementation projects.
- Experience with designing and implementing Water Supply project management procedures.
- International project experience in Water & Sanitation projects would be an asset.
- International / Local experience in managing work contracts hiring multiple contractors and suppliers under a single project / programme. Special experience in managing contractual disputes under FIDIC terms and conditions of contract.
- Experience with PRINCE2 or equivalent project management methodology/approach is highly desirable.

c. Key Competencies *(Technical knowledge, managerial competencies or other personal competencies*

relevant to the performance of the assignment):

Management/technical competencies

- Excellent and proven managerial, organizational, leadership and teamwork skills;
- Meets with mid level UN Managerial competency requirements;
- Ability to professionally manage and lead a large team and to coordinate with technical counterparts and national/local authorities/institutions;
- Sound technical knowledge of Civil / Environmental Engineering Record and/or Water & Sanitation Systems is a must.
- Good communications skills including ability to write technical reports and prepare and present concise reports in English.
- Knowledge of the UN system and familiarity with UNOPS procedures is an advantage.

General

- Fluency in English. Working knowledge of local language Dhivehi would be desirable.
- Proficient computer skills especially Microsoft applications and AutoCAD drawing software.
- Seeks and applies knowledge, information, and best practices from within and outside of UNOPS.
- This post is open only to the local eligible professionals or those who have the required license to work in Maldives.