Republic of Seychelles

TECHNOLOGY ACTION PLAN – ADAPTATION

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SEYCHELLES TECHNOLOGY ACTION PLAN REPORT – ADAPTATION

AUTHORS
Chapter 1 – Michèle Martin, National Adaptation Expert: Coastal Zones
Chapter 2 - Hervé Barois, National Adaptation Expert: Water Sector

EDITOR
Prakash (Sanju) Deenapanray, TNA Team Leader; also wrote some parts of Chapter 2

REVIEWERS

Bothwell Batidzirai (Energy Research Centre, University of Cape Town); Gordon Mackenzie (UNEP DTU Partnership, Denmark).

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FOREWORD

Seychelles had made a great impact in the international arena in championing the cause of Small Island Developing States and the fight against climate change. We have already made great progress towards a sustainable and climate-resilient future. Our environmental legislation to ensure sustainable tourism and fishing is some of the strongest in the world. Nearly half of our land and one third of our vast marine territory are already protected.

As a SIDS, climate action and sustainable development are a matter of survival. They are two mutually reinforcing sides of the same coin. Storms, coastal erosion and rising sea levels can halt and reverse sustainable development initiatives in a matter of hours or days. Our Blue Economy initiative is drawing the world's attention by linking the alleviation of poverty and improved food security with reduced environmental risks and ecological imbalances.

Recognizing that resilience to climate change is essential to support a people-centered development strategy, Seychelles adopts forward-thinking, innovative approaches to cope with expected climate change impacts. International partnerships are forged to exchange information and invest in innovative climate resilient development pathways, technology development and transfer. National polices and institutions are aligned with needs to build adaptive capacity. Improved access to climate finance, information and services, is supported by leveraged investment in low carbon climate resilient technologies and industries, such as water resource management, renewable energy, and others.

Therefore undertaking the "Technology Needs Assessments and Technology Action Plans Report for Climate Change Adaptation in Seychelles" is key in our fight to combat climate change. As you all are aware science and technology are importance tools for implementing mitigation and adaptation measures for both developed and developing countries. The latter, in particular, has become more pressing to develop and acquire key technologies to cope with climate change, including disaster in various forms and severity. A lot has already been done to respond to climate change and yet the threat remains huge that more needs to be done with even greater urgency. In conducting the TNA process, consultation with key stakeholders was the core approach taken at every stage. Stakeholders scored and identified the sectors and technologies that needed to be given priority in devising the needed actions. They went on to identify the barriers that would hinder the diffusion of the selected technologies and specified measures required to overcome the barriers. I am grateful to the stakeholders who participated in the process over a period of about two years. Thus, the TNA Report provides an assessment of the priority technology requirements and action plans for climate change adaptation activities in water and coastal sectors. I am convinced that this exercise has been a nationally driven process involving local expertise and knowledge supplemented by international experiences.

In fulfillment of the Government's firm commitment towards taking appropriate national actions for tackling climate change related issues and also collaborative obligations to the

international community in this context, I have great pleasure in presenting the Seychelles' National Report on Technology Needs Assessment and Technology Action Plans for Climate Change Adaptation in Seychelles to the policy makers, potential investors, technology developers, scientists and all other stakeholders who are actively participating in sustainable development efforts of the country. I also recommend this report for consideration and emulation of the world community and invite them to be partners in achieving our economic, environmental and social development goals.

I thank our partners, the United Nations Environment Programme (UNEP) and the UNEP DTU Partnership (UDP) in collaboration with the Regional Centre Energy Research Centre, and GEF for the financial support rendered to the TNA process in Seychelles. It remains for all of us to work together to ensure that the results of this intense and elaborate process will result in tangible and practical initiatives on the ground.

We need action from everyone, everywhere. All sectors of society must be involved: government, businesses and civil society. As a Small state we have big ideas and big political will. Our experiences, commitment and insights will be invaluable as we implement the TNA Action Plans, we therefore need the support of everyone to build on the progress we have already made.

Hon. Didier Dogley
Minister for Environment, Energy and Climate Change

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Pugazhendi Murugaiyan
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List of Acronyms

CC	Climate Change
CRMM	Coastal Risk Monitoring and Mapping
DECC	Department of Energy and Climate Change
DRDM	Department of Risk and Disaster Management
DWSP	Drinking Water Safety Plan
EBA	Ecosystem Based Adaptation
EIA	Environmental Impact Assessment
ENSO	El Niño Southern Oscillation
EPA	Environment Protection Act
ETF	Environment Trust Fund
GCCA+	Global Climate Change Alliance
GCM	Global Circulation Model
GEF	Global Environment Facility
GIS	Geographic Information System
INDC	Intended Nationally Determined Communication
IRBM	Integrated River Basin Management
IWRM	integrated Water Resources Management
JICA	Japan International Cooperation Agency
LIDAR	Light Imaging, Detection, And Ranging
LWMA	Landscape Waste Management Agency
MCA	Multi Criteria Analysis
MCSS	Marine Conservation Society of Seychelles
MEECC	Ministry of Environment, Energy and Climate Change
Ml	Million litres
MLUH	Ministry of Land Use and Habitat
NCCC	National Climate Change Committee
NCCS	National Climate Change Strategy
NDRMP	National Disaster Risk Management Policy
NGO	Non-Government Organisation
NISTI	National Institute of Science, Technology and Innovation
NRW	Non-Revenue Water
PCU	Project Coordinating Unit
PSC	Project Steering Committee
PUC	Public Utilities Corporation
RCP	Representative Concentration Pathway
RWH	Rainwater Harvesting
SCCF	Special Climate Change Fund
SCR or SR	Seychelles Rupee
SEYCCAT	Seychelles' Conservation and Climate Adaptation Trust
SIDS	Small Island Developing States
SLR	Sea Level Rise
SLTA	Seychelles Land Transport Agency
SMA	Seychelles Meteorological Authority
SNC	Second National Communication
SSDS	Seychelles Sustainable Development Strategy
SSP	Seychelles Strategic Plan
TNA	Technology Needs Assessment
TNC	Third National Communication
TWG	Technical or Technology Working Group

UDP	UNEP DTU Partnership
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
USD	United States Dollar
UNISEY	University of Seychelles
WEAP	Water Evaluation And Planning
WIO	Western Indian Ocean

Executive Summary

The Technology Action Plan (TAP) Report is the third and final report under the Seychelles Technology Needs Assessment (TNA) project. The TAP Report documents the Actions and Activities that emanate from an inclusive, multi-stakeholder process for promoting climate change adaptation technologies in the coastal zone and water sectors through the removal of financial and non-financial barriers, and the creation of appropriate enabling environment for technology uptake and diffusion. The Actions are derived from the measures that were identified in the Barriers Analysis and Enabling Framework (BAEF) Report, namely the second report generated under the Seychelles TNA project. Each TAP provides a multi-annual action plan with budgeted activities, and accompanied by a logical framework with objectively verifiable indicators, and a risk and contingency matrix in order to achieve long-term (2030) technology penetration targets. Further, each TAP lists the national stakeholders that will be responsible for the planning and implementation of the Activities that are proposed.

The TAPs will be useful to a broad audience, including policy makers, technology analysts, suppliers and end users of the proposed mitigation technologies, researchers, the private sector, and local, regional and international financial institutions. Importantly, the TAPs can be used to inform the post-2018 dialogues planned to review and to increase the ambition of the adaptation targets that were proposed in the Seychelles Nationally Determined Contribution.

While all Activities and Actions would need to be implemented in order to achieve the ambitions set in the TAPs, there are nevertheless 'low-hanging fruits' that can be achieved in terms of taking strides towards achieving the final technology targets. Therefore, a selected set of Activities presented in the TAPs have been retained for fast-tracking technology implementation in the form of Project Ideas (PIs). In short, the PIs contain the 'must-haves' in order to achieve the proposed technology targets. The rationale for selecting the Activities or Actions comprising the PIs is based on immediate urgency of action; the capacity to create an enabling environment that is supportive of the implementation of the other Actions/Activities; and ability to support the uptake of several adaptation technologies simultaneously.

The following sections summarise the main contents of the TAPs and PIs for the two sectors. The summary states the adaptation technology, its ambitions and sustainable development benefits; lists the Actions proposed to reach a particular technology penetration target; provides an estimate of expected costs and their proposed sources of funding; and describes the contents of the Project Ideas.

Technology Action Plans (TAPs) and Project Ideas (PIs) for the Coastal Zone Sector

Two TAPs and two PIs have been developed for the coastal zone sector. While the TNA project prioritised three technologies in the sector, the adoption of an ecosystem-based approach (EBA) and the similarities between the measures proposed for wetland restoration and dune rehabilitation have led to the combination of these technologies into a single TAP.

<u>Action Plan for Coastal Risk Mapping & Monitoring (CRMM)</u>

Ambition and benefits

The objective is that a coastal risk monitoring and mapping programme will be implemented for all vulnerable sites on the main three islands, and sustained at least until the target year of 2030. The goal is for informed, science-based decision making about coastal dynamics and climate change to be mainstreamed into the planning of all developments or coastal protection measures along the coast.

The sustainable development benefits of the TAP are: (i) improved science education and skills, (ii) improved planning and protection of coastal infrastructure, and (iii) job creation.

Proposed Actions and timeline for implementation

Action 1: Invest in coastal monitoring and mapping technologies – Urgent start in year 1 and maintain/upgrade until 2030;

Action 2: Build institutional capacity for a national hub for coastal research, monitoring, mapping and reporting –focus on this heavily for years 1-3 then maintain until 2030;

Action 3: Revise legislation to ensure data sharing and science-based decision-making for coastal zone developments – years 1-2;

Action 4: Establish internship program and university partnerships to build technical expertise Start in years 1-2 and build steadily until 2030; and

Action 5: Support a comprehensive education & awareness program to promote climate science and science-based decision-making. Training workshops for decision-makers in year 1 then build and maintain until 2030.

Estimation of costs of actions and activities

The TAP is estimated at ~USD 19 million that will be funded mainly through grant financing from development partners. In some cases, recurrent budget could be supported by local funding mechanisms such as the Environment Trust Fund (ETF) and Seychelles' Conservation and Climate Adaptation Trust (SEYCCAT), given their relevance to climate change and environmental management.

Action Plan for Coastal Ecosystem Restoration: Wetlands and Dunes

Ambition and benefits

The TAP seeks to support integrated coastal ecosystem restoration at ten vulnerable wetland and dune sites: two on Mahé (Baie Lazare, Beau Vallon) and eight on Praslin (Cote d'Or, Grand Anse, Baie Ste Anne, Cap Samy, Anse Kerlan, Nouvelles Decouvertes, Au Cap, Anse St Saveur/Takamaka, Anse Gouvernement). Each site will require studies, consultation with stakeholders, and development and implementation of a rehabilitation plan addressing the affected degraded ecosystems in an integrated way.

The sustainable development benefits of the TAP are: (i) improved public use of coastal areas, (ii) ecosystems restored and protected, (iii) job creation, and (iv) protection of coastal resources for tourism.

Proposed Actions and timeline for implementation

Action 1: Explore strategies to promote investment in coastal ecosystem protection and fund coastal ecosystem restoration projects by public and private sectors -This action will begin urgently in year one in terms of finding innovative funding sources. Project/grant writing can continue throughout until 2030 as opportunities arise;

Action 2: Policy and legal reform - Some work has already been initiative in terms of revisions to the wetland policy and the EPA.These should be consolidated and adopted, ready for enforcement by year 3;

Action 3: Improve Institutional set up and organizational capacity to coordinate and lead coastal ecosystem restoration - This must be done urgently within the first 2-3 years. Without institutional improvement, the coordination and supervision of coastal EBA activities will be severely undermined;

Action 4: Build technical expertise in coastal ecosystem restoration and EBA - This has already begun with the inclusion of coastal and climate science in the University of Seychelles environmental science program, but more needs to be done on an ongoing basis until 2030 and beyond to continue improving this program and developing opportunities for professionals already in the field to upgrade their knowledge and expertise;

Action 5: Improve awareness and understanding of climate change and EBA methods to protect the coast among key stakeholders - Similarly, some work has already been initiated in this field for the general public and schools, and this can be maintained throughout until 2030. However there is an urgent need in year 1 to ensure that decision-makers, planners and engineers have participated in training and site visits to help them understand the urgency of protecting the coast

and the role of coastal EBA vs hard engineering methods. This should be repeated around year 5 for new personnel; and

Action 6: Undertake restoration projects as research and share knowledge with other SIDS - There are already several coastal EBA projects underway which will require maintenance throughout the time frame. It is envisioned that at least one new coastal EBA project will be initiated each year over 12 years at vulnerable dune and wetland hotspot sites. Each project will take from 1-3 years to implement depending on the scale of work needed at each site. An international conference on coastal EBA should take place around year 3, to allow Seychelles to share experience as well as gain new insights and approaches prior to undertaking further projects.

Estimation of costs of actions and activities

The TAP would require a total budget of around USD 6.6 million for its implementation over a twelve year period. Grant funding can be sought from international agencies (e.g. Green Climate Fund) to secure the necessary funds for implementation of restoration work and supporting measures. Some costs would need to be borne by the government of Seychelles but could be supported by local funding mechanisms such as the ETF and SEYCCAT.

PIs for the Coastal Zone Sector

1. *Project Idea 1 - Climate change education & training:* Climate change education, awareness and training were identified as a key measure under several of the technologies proposed for protecting the coast against climate change. The national climate change policy included measures for CC education and training but many activities were not funded. This project idea is based on the climate change education and training strategy. The PI is expected to cost US$200,000 over 2 years; and
2. *Project Idea 2 - Legal and policy reform:* Seychelles is generally known to have good environmental laws and policies which are under regular revision. One of the greatest challenges is ensuring harmonisation among different legal instruments to ensure protection of the environment and that loopholes are eliminated. Under the two TAPS developed under the Coastal TNA process, both identified legal and policy inadequacies as barriers to the adoption of EBA based technologies to protect the coast. The PI is expected to cost US$60,000 over 2 years.

Technology Action Plans (TAPs) and Project Ideas (PIs) for the Water Sector

Three TAPs and four PIs have been developed for water sector.

Action Plan for rooftop Rainwater Harvesting (RWH)

Ambition and benefits

Twenty five thousand (25,000) households are targeted over a period of 5 years corresponding to 90% of total household nationwide.

The sustainable development benefits of the TAP are: (i) reduced water restriction and deficit during dry periods, (ii) creation of 50 jobs, and (iii) household savings on water bills.

Proposed Actions and timeline for implementation

Action 1: Remove Value Added Tax on RWH equipment – Urgent start in year 1 (Q1-2019 to Q4-2019);

Action 2: Improve access to quality products and services– Exhibitions will be carried out in districts between 2019 and 2022 in order to promote access to RWH equipment*;*

Action 3: Support the development of a National Water Policy and Water Act **–**This enabling Action will be carried out at the omset of the TAP implementation and it will also form part of the PI as an urgent Action. Since multi-stakeholder coordination and meetings will be required, this Action will not be completed (i.e. policy and Water Act approved) until Q3-2020;

Action 4: *Develop national standards and regulations for RWH* – Before quality products are made available on the local market, there will be a need to establish technical standards for certifying the quality of RWH equipment. The Activities will start early in 2019 and the standards are expected to be approved by Q3-2020;

Action 5: *Revise the Building Code to integrate RWH* – Activities completed between Q2-2019 andQ2-2020;

Action 6: *Support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and rainwater harvesting* -Activities completed between Q1-2019 andQ1-2020;

Action 7: *Increase public information and awareness via selected media on RWH*– The Activity will be initiated at the beginning of 2019 and will continue on a regular basis until the end of the TAP lifetime – i.e. 2023. A documentary and TV spots on RWH will be completed at the beginning of 2020; and

Action 8: *Establish project reference in districts on RWH* – Siting to install RWH in districts will be completed in Q1-2019, and installation of reference RWH systems in all districts will be carried out between Q2 and Q4 2019. Results of performance will be disseminated to households between Q3-2019 and Q2-2020.

Estimation of costs of actions and activities

The TAP will require a budget of around USD 317,000 for its implementation. Funding can be sought from international agencies (USD 306,000) but some costs would need to be borne by the Government of Seychelles (grant: USD3,000; in-kind: USD8,000).

Action Plan for Ground Surface Rainwater Harvesting (GWH)

Ambition and benefits

Fifty (50) sites are targeted over a period of 10 years on Mahé, Praslin and La Digue.

The sustainable development benefits of the TAP are: (i) reduced water restrictionsand deficit during dry periods, (ii) 15 jobs created, and (iii) increase in famers' savings on water bills.

Proposed Actions and timeline for implementation

Action 1: *Remove Value Added Tax on RWH equipment* – Urgent start in year 1 (Q1-2019 to Q4-2019);

Action 2: *Support the development of a National Water Policy and Water Act* –This enabling Action will be carried out at the onset of the TAP implementation and it will also form part of the PI as an urgent Action. Since multi-stakeholder coordination and meetings will be required, this Action will not be completed (i.e. policy and Water Act approved) until Q3-2020;

Action 3: *Support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and ground surface water harvesting* - Activities completed between Q1-2019 andQ1-2020; and

Action 4: *Increase public information and awareness via selected media on RWH*– The Activity will be initiated at the beginning of 2019 and will continue on a regular basis until the end of the TAP lifetime – i.e. 2023. A documentary and TV spots on RWH will be completed at the beginning of 2020.

Estimation of costs of actions and activities

TheTAP budget is estimated around USD 127,000. Funding can be sought from international agencies (USD 122,000) but some costs would need to be borne by the Government of Seychelles (in-kind: USD 5,000).

Action Plan for Water Efficient Appliances and Fixtures

Ambition and benefits

25,000 households are targeted over a period of 5 years corresponding to 90% of total household nationwide.

The sustainable development benefits of the TAP are: (i) reduced water restriction and deficit during dry periods, (ii) creation of 15 jobs, and (iii) household savings on water bills.

Proposed Actions and timeline for implementation

Action 1: Remove Value Added Tax on water efficient appliances and devices – Urgent start in year 1 (Q1-2019 to Q4-2019);

Action 2: Support the development of a National Water Policy and Water Act –This enabling Action will be carried out at the onset of the TAP implementation and it will also form part of the PI as an urgent Action. Since multi-stakeholder coordination and meetings will be required, this Action will not be completed (i.e. policy and Water Act approved) until Q3-2020;

Action 3: Develop national standards and labelling system for water efficiency – Before quality products are made available on the local market, there will be a need to establish technical standards for certifying the quality of appliances and fixtures systems. The Activities will start early in 2019 and the standards are expected to be approved by Q3-2020;

Action 4: Revise the building code to integrate water efficiency standards and guidelines – Activities completed between Q2-2019 andQ2-2020;

Action 5: Support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and water efficiency -Activities completed between Q1-2019 andQ1-2020;

Action 6: Increase public information and awareness via selected media on water efficiency – The Activity will be initiated at the beginning of 2019 and will continue on a regular basis until the end of the TAP lifetime – i.e. 2023. A documentary and TV spots on water efficient appliances and devices will be completed at the beginning of 2020; and

Action 7: Establish project reference on water efficiency in districts – Siting to install water efficient appliances and devices in districts will be completed in Q1-2019, and installation of reference systems in all districts will be carried out between Q2 and Q4 2019. Results of performance will be disseminated to households between Q3-2019 and Q2-2020.

Estimation of costs of actions and activities

The TAP will require around USD 228,000 for its implementation. Funding can be sought from international agencies (USD 220,000) but some costs would need to be borne by the Government of Seychelles (in-kind: USD 8,000).

PIs for Water Sector

1. *Project Idea 1 - VAT exemption on water adaptation technologies:* All three technologies are consumer goods, and price is a key determinant for stimulating buying behaviour. Financial incentives are therefore an effective means of stimulating market demand for the adaptation technologies. Since the analyses for investigating the impacts of VAT exemption on (i) creating market demand for technologies, and (ii) government revenues are similar, the proposed studies required to set up the financial incentive can be bundled up. The PI is expected to cost US$96,000 and is planned for implementation in 2019;
2. *Project Idea 2 – Policy and regulatory framework to support adaptation in the water sector:* Currently, there is no National Water Policy in the Seychelles to promote efficient, equitable and sustainable use of water resources. The PUC Act is mainly a water services Act. The PI will provide a coherent policy framework with accompanying legal instrument for promoting the sustainable use of water resources in Seychelles, while also addressing the detrimental impacts of climate change and climate variability on the sector. The PI is expected to cost US$28,500 and is planned for implementation in 2019 and 2020;
3. *Project Idea 3 – Institutional design for enhanced water management:* Within the broader ambit of Project Idea 2 it would be useful for Seychelles to adopt IWRM as a systemic approach to managing water resources at all levels. Consequently, there will be the need to set

up the appropriate institutional arrangement. The PI is expected to cost US$26,500 and is planned for implementation in 2019 and 2020; and

4. *Project Idea 4 – Stimulating market demand through public awareness:* In support of the financial incentive, creating consumer awareness on the benefits of the adaptation technologies is a reinforcing element in stimulating their market demand. This PI will focus mainly on the adaptation technologies that are targeted to households – i.e. RWH and water efficient appliances and devices – because of the scale and ambition of targets.The PI is expected to cost US$26,000 and is planned for implementation between 2019 and 2023.

Chapter 1 Technology Action Plan and Project Ideas for the Coastal Zone Sector

1.1 TAP for the Coastal Zone Sector

1.1.1 Sector overview: Seychelles Coastal Zone

Being a small island developing state (SIDS), Seychelles relies heavily on its coastal zone as a site of economic development, critical infrastructure, and housing. Because of Seychelles' mountainous topography, most critical infrastructure is found in the narrow coastal plateau surrounding the main populated islands of Mahé, Praslin and La Digue (Republic of Seychelles, 2017a). This includes main roads, electricity and water supply infrastructure, ports, fisheries infrastructure, and many buildings including hotels. The mean elevation of the coastal plateau around the granitic islands is 2-10m (Mendez et al., 2013), however most of the critical infrastructure like roads, power stations and food storage are in the range of 2-4m above sea level and most vulnerable to sea level rise and flooding.

Seychelles has tried to adopt an Integrated Coastal Zone Management (ICZM) approach to development since the early 1990s (EMPS, 2000), but this has proved difficult to put into practice due to the diversity of stakeholders in the coastal zone and to sectoral fragmentation, e.g. between environmental conservation, tourism and other developments in the coastal zone, and planning. Nonetheless there are several policies, laws, regulations and planning guidelines in place that support the protection of coastal ecosystems and the adoption of measures to protect the coast from climate change. These are summarized in **Table 1**, but the main one is the newly revised Environment Protection Act (2016) which makes provision for protection of coastal zones, allocation of no development and climate based zones, and zones dedicated to conservation and rehabilitation of coastal biodiversity. The listed coastal habitats include coral reefs, mangroves, marshes, and areas of scenic value such as beaches.

Table 1. Existing laws and policies related to coastal protection from climate change.

Name	Year adopted	Main contents	Lead agency	Status
Environment Protection Act	1992 rev. 2016	This recently revised act is the main instrument for environmental protection in Seychelles, and addresses protection of the coastal zone, with passing reference only to its vulnerability to the impacts of climate change.	Ministry of Environment, Energy & Climate Change	Recently updated and in force. Does not specifically address climate change
Town and Country Planning Act	1972 updated June 2012	This act is under revision. The 25 m setback from the high tide water mark currently being applied by the Ministry for environment will be incorporated into the new version.	Seychelles Planning Authority	Does not specifically address the coast, wetlands or climate change
State Land and River Reserves Act	1903	This act makes provision for a setback of 10m on either side of a river but does not specifically mention the coastal zone or wetlands	Ministry of Environment, Energy & Climate Change	Does not specifically address the coast, wetlands, or climate change
Wetland Policy	2005 rev.2017	The objective of this policy is to protect and conserve wetlands in order to benefit from their functions and values. It is under review and has yet to be specifically integrated into any laws or regulations.	Ministry of Environment, Energy & Climate Change	Under review

Source: TNA project

The technology working group for the TNA Coastal Zone Adaptation sector has prioritised three technologies to protect the coast from the impacts of climate change. Interestingly none of these rely on hard engineering; rather they focus more on improved coastal monitoring, planning and ecosystem

based adaptation strategies (some of which may be combined with a degree of hard engineering solutions). The three technologies are (Republic of Seychelles, 2017a):

1. **Coastal risk mapping and monitoring**: This includes improving Seychelles ability to monitor coastal dynamics, map out coastal features and changes to the coast (both on land and in the shallow waters around the coast including coral reefs), and model how changes to the coast due to proposed developments or coastal protection measures will affect coastal dynamics and the movement of sand. The aim is to improve decision-making about coastal developments and protection measures by basing it on sound scientific understanding of coastal dynamics.The technology targets vulnerable sites along the coast of the three most populated islands: Mahé, Praslin and La Digue. There is already some capacity in Seychelles to do this, but it is limited, dispersed between different organisations, and not coordinated on a national level.

2. **Wetland restoration**: This technology is an ecosystem-based strategy intended to control flooding in the coastal zone due to heavy rains. The coastal wetlands in Seychelles targeted mangrove forests and freshwater marshes under this technology mangrove forests and freshwater marshes, which are in most cases adjacent to and interconnected with river outlets and beaches. For the purposes of the TNA, restoration activities will focus on Praslin. Wetlands enjoy some measure of protected status in Seychelles but suffer from historic fragmentation as well as ongoing encroachment and drainage due to their proximity to populated areas and economic developments. The aim of the technology is to improve targeted wetlands' ability to absorb heavy rains and protect the coast from erosion, while providing a functional habitat for biodiversity and interesting sites for ecotourism. There are several wetland restoration and conservation projects already underway in Seychelles, but there is also a need for much more work to bring wetlands back to a level of functionality as coastal zone protection measures using a multi-stakeholder approach.

3. **Dune rehabilitation**: Seychelles relies heavily on its many beaches for socio-cultural activities and tourism, and yet many of them are already showing signs of severe erosion due to multiple factors including climate change. Maintaining healthy dunes and beaches is a priority for the government, but often quick-fix hard engineering methods have had to be used to address severe problems urgently. The aim of this technology is to target several high-use vulnerable beaches and put in place measures to rehabilitate and regenerate the dune ecosystem for the long term, possibly in combination with some hard engineering solutions such as carefully designed rock revetments and semi-artificial coral reefs. There have been some dune rehabilitation efforts already implemented in Seychelles: the TNA will seek to build on lessons learned and try out new techniques in collaboration with local stakeholders.

The latter two technologies are closely interrelated.Physically, the beach sections of Seychelles' narrow coastal strip tend to have both wetlands and dunes in very close proximity. Ecologically, wetlands and dunes share many similarities in terms of the pressures from human activity leading to ecological degradation. Consequently, they face similar barriers to restoration attempts. In the Barrier Analysis and Enabling Framework (BAEF) Report (Government of Seychelles, 2017b) it was shown that the measures needed to overcome these barriers and restore natural functionsof flood reduction (wetlands) and erosion control (dunes) were almost identical. For the purposes of the Technology Action Plan (TAP), the technologies of wetland restoration and dune rehabilitation will be considered as a single, holistic technology labelled "Restoration of Coastal Ecosystems". Both employ soft technologies and form part of a larger set of integrated approach called ecosystem based adaptation.

1.1.2 Action Plan for Coastal Risk Mapping & Monitoring

1.1.2.1 Introduction

This technology encompasses a variety of methods to map and monitor coastal areas and coastal dynamics, both onshore and offshore to just beyond the coral reefs, as a means of climate change

adaptation. The geographic focus is on the main three islands (Mahé, Praslin and La Digue) at vulnerable sites where critical infrastructure is located and/or further development planned. Currently, decision-making about coastal protection measures and coastal development is not science-based because up to date scientific information about coastal dynamics is simply not available unless specially commissioned. The aim is to improve decision-making for better protection of the coast against climate change impacts such as flooding, sea level rise and storm surges.The technology was selected because mapping and monitoring of coastal processes is generally considered to be a basic necessity for the successful implementation of all other technologies used to protect the coast from the impacts of climate change.It was prioritised as the most efficient and economical means to improve coastal protection in Seychelles, with the greatest potential impact of all technologies considered.

The technology includes the following:

- mapping of coastal ecosystems (using high resolution satellite imagery mainly but also ground-proofing with field studies), bathymetry;
- creating risk maps identifying key coastal areas susceptible to heavy rains, flooding, erosion and other impacts of climate change;
- Beach profiling in key vulnerable sites;
- Studies of coastal dynamics (waves, currents, sand movement) at vulnerable sites using Acoustic doppler current profilers (ADCPs) installed offshore near vulnerable beaches; and
- Modeling impacts of coastal protection measures or developments on an existing coast, to choose best options with desired result.

At present, any available data, maps, models and other information about the coastal environment are not readily available in one centralised location, or coordinated by one central agency. There are many different stakeholders involved, including the Coast Guard, the MEECC, NGOs, private developers, MLUH, and the Meteorological Agency. A major part of the proposed technology involves improving institutional coordination, and improving institutional capacity of the lead agency.**Annex 1**provides information about the stakeholders involved in developing the TAP, as well as the sustainable development benefits of the coastal adaptation technology. The prevailing practice regarding Coastal Risk Monitoring and Mapping (CRMM) is also provided.

1.1.2.2 Ambition for the TAP

The objective is that a coastal risk monitoring and mapping programme will be implemented for all vulnerable sites (with critical infrastructure and/or developments) on the main three islands, and sustained at least until the target year of 2030. The goal is for informed, science-based decision making about coastal dynamics and climate change to be mainstreamed into the planning of all developments or coastal protection measures along the coast.

1.1.2.3 Actions and Activities selected for inclusion in the TAP

This section provides a discussion of the Actions and Activities that have been selected to inclusion in the CRMM TAP. The Actions are linked to the measures that were identified following detailed analyses of barriers facing the technology (Government of Seychelles, 2017b), as well as the enabling environment required to promote the technology. A programmatic approach is used to justify the formulation of TAP. While the technology transfer will rest on the implementation of all Actions, Project Ideas have been proposed to start the technology transfer process by focusing on Actions and Activities of immediate urgency and those presenting low-hanging fruits. The Project Idea will focus on promoting an enabling environment that will be supportive of other adaptation technologies.

Summary of barriers and measures to overcome barriers

Table 2provides a summary of the identified barriers and measures for CRMM.

Table 2. Overview of barriers and measures to overcome these for CRMM.

Categories	Identified barriers	Measures to overcome barriers

Categories	Identified barriers	Measures to overcome barriers
Economic and financial	High costs of mapping and monitoring coastal zones	• Seek funding to invest in coastal monitoring equipment, as well as computer hardware and software for storing and processing data
Legal and regulatory	Weak legal framework for science-based decision-making	• Revise the EPA in order to mandate sharing of data and reports generated by non-state actors with the national authority designated as the hub • Revise the Town and Country Planning Act to require scientific evidence that proposed developments on the coast are suitable for long-term protection
Network structures	Network failures and weak coordination	• Build human and institutional capacity to coordinate stakeholders
Institutional and organizational capacity	limited institutional capacity to coordinate mapping and monitoring	• Designate one national authority with existing capacity as the hub for monitoring and mapping coastal processes, and generating reports to guide decision-making • Allocate government funding for operational costs to coordinate mapping, monitoring, data management and reporting
Human skills	Limited human capacity to undertake the work	Establish internships and university partnerships to promote research and learning of coastal processes on a national basis with all of the stakeholders
Social, cultural and behavioral	Resistance to change	Establish and deliver short term training programs on climate science for decision-makers
Information and awareness	• Limited understanding of science-based decision-making • Insufficient knowledge of climate science and coastal protection measures	• Building capacity to further develop STEM education in schools at all levels; • Enhance climate change education in the school curriculum • Develop media programs to make climate science understandable and relevant to the general public.

Source: Republic of Seychelles, 2017b

Actions selected for inclusion in the TAP

Table 3provides an assessment of the measures considered for inclusion in the TAP.These measures are based on the problem/objective trees from the BAEF Adaptation Report (Republic of Seychelles, 2017b) and have already been identified as critical for inclusion in the TAP.The factors used to assess each measure are cost effectiveness, efficiency, interactions with other measures, suitability, and benefits/costs as per the TAP Guidelines (UNFCCC and UDP, 2017).

Table 3. Ranking of measures for inclusion in the CRMM TAP.

Measures to overcome barriers	Assessment	Ranking
<u>Financial barriers</u> 1. Investments in coastal monitoring equipment, as well as computer hardware and software for storing and processing data	As a small island developing state (SIDS), the coastal zones of Seychelles are inherently vulnerable to climate change and climate variability, especially given that the topography forces most development to take place on the low-lying coastal zones of the granitic islands. As communicated in the Seychelles Nationally Determined Contributions (NDC), the most pressing and costly adaptation interventions need to take place in the coastal zones (Government of Seychelles, 2015). This measure has numerous interactions with other measures, since all of the other measures are meaningful only when interventions are implemented.	high
<u>Institutional and organizational barrier</u> **2.** Designate one national authority	This measure is critical as it is the main barrier for the technology, but it will be the most challenging to implement. Depends on other measures.	high

with existing capacity as the hub for monitoring and mapping coastal processes, and generating reports to guide decision-making		
Legal and regulatory barrier 3. Revise the EPA in order to mandate sharing of data and reports generated by non-state actors with the national authority designated as the hub	Cost effectiveness and efficiency will depend on approach and enforcement but can tie into other national initiatives such as the revision of the climate change policy and strategy. May be implemented as regulations.	med
Legal and regulatory barrier **4.** Revise the Town and Country Planning Act to require scientific evidence that proposed developments on the coast are suitable for long-term protection	Same as (3). May be more difficult to implement fully due to recent history of failed attempts to update the TCPA. Can possibly be tied into the process of reviewing the EPA, which already has a section on coastal zone.	low
Social, cultural and behavioral **5.** Establish and deliver short term training programs on climate science for decision-makers	Very cost effective and simple, will help support other measures. Can be done as short training for MNAs as well as senior managers. Ties into climate change strategy.	high
Institutional and organizational barrier 6. Allocate government funding for operational costs to coordinate mapping, monitoring, data management and reporting	This is critical to the success of this technology and may be the most challenging to implement. It will go hand in hand with measure 2 above.	high
Human capacity barrier **7.** Establish internships and university partnerships to promote research and learning of coastal processes on a national basis with all of the stakeholders	Very cost effective and already being done to some degree. Need to seek opportunities for Seychellois to gain more technical skills and expertise wherever possible but also learn from overseas expertise.	high
Information and awareness barrier 8. Build capacity to further develop STEM education in schools at all levels;	Already under consideration in Seychelles, NISTI designated body can use the support. Climate change a good theme for STEM and very suitable to Seychelles. Can be combined with measure 9.	high
Information and awareness barrier 9. Enhance climate change education in the school curriculum	Ties into other measures (8) above and into other technologies on climate change. Ministry of Education and other education institutions open to support. Could be combined with measure (8).	high
Information and awareness barrier 10. Develop media programs to make climate science understandable and relevant to the general public.	This measure will be in support of education initiatives targeting schools and could be collapsed into one overarching measure related to raising awareness of climate science and the importance of science based decision-making.	High

Source: TNA project

Following this assessment, the measures from **Table 3** to be included in the TAP for CRMM have been slightly reorganised as shown in**Table 4**.

Table 4. Final selection of measures to be included as Actions in TAP for CRMM.

Categories	Identified measures to overcome barriers	Measures selected as Actions for inclusion in TAP
Economic and financial	Seek funding to invest in coastal monitoring equipment, as well as computer hardware and software for storing and processing data	1. Seek funding to invest in coastal monitoring equipment, as well as computer hardware and software for storing and processing data
Legal and regulatory	• Revise the EPA in order to	2. Revise the EPA to ensure

	mandate sharing of data and reports generated by non-state actors with the national authority designated as the hub • Revise the Town and Country Planning Act to require scientific evidence that proposed developments on the coast are suitable for long-term protection	regulations for data sharing for coastal EIAs and scientific evidence that proposed developments on the coast are suitable for long-term protection
Network structures	Build human and institutional capacity to coordinate stakeholders	Combined with institutional below
Institutional and organizational capacity	• Designate one national authority with existing capacity as the hub for monitoring and mapping coastal processes, and generating reports to guide decision-making • Allocate government funding for operational costs to coordinate mapping, monitoring, data management and reporting	3. Build capacity and financial support for an existing national authority (e.g. GIS Unit in the MEECC) to actas hub for monitoring and mapping coastal processes, coordinating with stakeholders, modeling, and generating reports to guide decision-making
Human skills	Establish internships and university partnerships to promote research and learning of coastal processes on a national basis with all of the stakeholders	4. Establish internships and university partnerships to promote research and learning of coastal processes on a national basis with all of the stakeholders
Social, cultural and behavioral	Establish and deliver short term training programs on climate science for decision-makers	Merged with information& awareness below
Information and awareness	• Building capacity to further develop STEM education in schools at all levels; • Enhance climate change education in the school curriculum • Develop media programs to make climate science understandable and relevant to the general public	5. Establish comprehensive education and awareness program to promote climate science and science based decision-making including: • Training for decision makers • STEM and climate change education in school curriculum • Media programs on climate science

Source: TNA project

Activities identified for implementation of selected Actions

Table 5 details the Activities for each Action (previously referred to as measure) that will be included in the TAP for CRMM.

Table 5. Summary of Actions for CRMM TAP and their corresponding Activities.

Summary of Actions	
Action 1:	**Investing in coastal monitoring and mapping technologies**
Action 2:	**Building institutional capacity for a national hub for coastal research, monitoring, mapping and reporting**
Action 3:	**Revising legislation to ensure data sharing and science-based decision-making for coastal zone developments**
Action 4:	**Establishing internship program and university partnerships to build technical expertise**
Action 5:	**Supporting a comprehensive education & awareness program to promote climate science and science-based decision-making**

Activities for Action implementation	
Action 1:Investing in coastal monitoring and mapping technologies	
Activity 1.1	Develop and implement a protocol for monitoring, mapping, modeling and reporting on coastal dynamics including coastal wetlands, dunes, waves, tides, sand movement, with a special focus on coastal sites on the three main islands that are vulnerable to climate change impacts. Integrate ISO level data standards for maintenance and upkeep of data
Activity 1.2	Invest in equipment and software to monitor, map and model coastal dynamics including waves, currents and sand
Activity 1.3	Update and maintain all major data sets includingsatellite imagery, bathymetry, beach monitoring, and coastal dynamics (wave, current, sand)
Activity 1.4	Map and regularly update coastal flood risk areas on the three main islands, and publish results.
Activity 1.5	Produce annual report for stakeholders and decision-makers on the state of the coast highlighting ongoing research, key activities, changes and challenges
Activity 1.6	Publish scientific papers on the work done and analysis of data collection for greater visibility and application
Action 2: Revising legislation to ensure data sharing and science-based decision-making for coastal zone developments	
Activity 2.1	Hire legal consultant to liaise with stakeholders and draft regulations
Activity 2.2	Approval of new regulations/legislation
Activity 2.3	Implement and enforce new legislation
Activity 2.4	Draft and sign Data Sharing Agreements to build meaningful and official linkages (MOU, etc) with other local and international organisations engaged in coastal monitoring and mapping
Action 3:Building institutional capacity for a national hub for coastal research, monitoring, mapping and reporting	
Activity 3.1	Restructure the GIS unit, create new posts and advertise locally, and regionally if necessary, recruitment of staff in various fields in section covering field work (M&E), GIS, Remote Sensing, Data management
Activity 3.2	Training opportunities for staff including short and long term, local and international in the relevantfields above along with transmission of information to decision makers
Activity 3.3	Establish a suitable office space for the new GIS Unit
Activity 3.4	Establish national coastal research/science committee to facilitate dialogue and exchange
Activity 3.5	Increase budget support for coastal monitoring and mapping to cover staffing, maintenance, research and operational costs
Action 4:Establishing internship program and university partnerships to build technical expertise	
Activity 4.1	Establish MOUs between MEECC, UniSey and other research institutions
Activity 4.2	Provide opportunities for student internships in government institutions and private sector organisations undertaking studies of coastal processes
Activity 4.3	Implement research programs in line with national coastal research protocol Activity 1.1, and publish results
Activity 4.4	Enhance UniSey environmental science and IT curricula related to GIS, mapping, data management, modeling, etc
Activity 4.5	Provide opportunities for Seychellois experts to work alongside international consultants undertaking studies of coastal processes at equivalent and fair pay rates
Activity 4.6	Develop partnerships with overseas universities and research institutions engaged in data collection, mapping, monitoring and modeling related to coastal processes
Action 5: Supporting a comprehensive education & awareness program to promote climate science and science-based decision-making	
Activity 5.1	Develop and implement a short training program for parliamentarians on climate change science and impacts
Activity 5.2	Develop and implement a short training program for senior managers on climate change science and impacts, targeting planning, environment, tourism, DRDM, finance, industry
Activity 5.3	Support STEM education program of NISTI and the Ministry of Education through development of teaching/learning materials, teacher training, and equipment for schools
Activity 5.4	Support climate change curriculum development and the development of teaching/learning materials for the Ministry of Education and other education institutions

Activity 5.5	Develop and implement a media campaign for the general public focused on climate change and the importance of climate science

Source: TNA project

Actions to be selected as Project Ideas

All of the above Actions (measures) are integrated and should be included in the TAP simultaneoulsy. Nevertheless, Project Ideas have been developed using Actions that cut across multiple adaptation technologies, and which will provide the enabling conditions for scaling up interventions. For instance, Action 5 will complement the climate change education recommendations from the other two technologies for the coastal zone and these could possible be combined together to create a national plan for climate change education and awareness that incorporates an emphasis on the need for sound science behind climate change adaptation planning.

Consequenlty, activities designed to create a more enabling framework and having a high urgency for the implementation of physical coastal restoration and protection measures will constitute PIs. These are:

- Education and awareness activities and /or workshops for decision-makers; and
- Policy and legal reform to introduce and strengthen legislation related todata sharing and use of sound science-based decisionmaking for planning coastal developments, infrastructure or protection measures.

1.1.2.4 Stakeholders and Timeline for implementation of TAP

Overview of Stakeholders

The roles of the main stakeholders for the implementation of the TAP for CRMM are given in **Table 6**.

Table 6. Roles of main stakeholders involved in the implementation of the CRMM TAP.

Key Stakeholders	Role
Ministry of Environment, Energy and Climate Change	Purchasing and maintenance of coastal research equipment, lead and coordinate data gathering, analysis, mapping, data management, coordination between stakeholders, production of reports
Department of risk and Disaster Management	Risk mapping and manage flood warning system, collaboration with MEECC to secure funding support for ongoing data collection to pre-empt risk of disaster
Seychelles National Meteorological Authority	Data collection on SLR, rainfall and other factors
Seychelles National Coastguard	Data collection on bathymetry
Ministry of Land Use and Habitat	Coordination and collaboration on mapping
University of Seychelles	Coordinate coastal research and internships, develop partnerships with other research institutions
National Institute for Science Technology and Innovation	Develop STEM education program with Ministry of Education
Ministry of Education	Enhance STEM education program and expand climate science in curriculum
Civil Society	develop and implement training and education programs in climate science, guidance and inputs on coastal research protocol and programs
Media Houses	disseminate information about climate science and science-based decision-making

Source: TNA project

Scheduling and sequencing of specific activities

A more detailed timetable for the activities can be found in the TAP overview table (**Table 8**). This TAP is planned for implementation over the period 2018-2030. However, for the five actions

envisioned under this TAP for coastal risk monitoring and mapping the sequencing would be approximately as follows:

- **Action 1:** **Invest in coastal monitoring and mapping technologies** – Urgent start in year 1 and maintain/upgrade until 2030
- **Action 2:** **Build institutional capacity for a national hub for coastal research, monitoring, mapping and reporting** –focus on this heavily for years 1-3 then maintain until 2030
- **Action 3:** **Revise legislation** to ensure data sharing and science-based decision-making for coastal zone developments – years 1-2.
- **Action 4:** **Establish internship program and university partnerships** to build technical expertise Start in years 1-2 and build steadily until 2030.
- **Action 5:** **Support a comprehensive education & awareness program** to promote climate science and science-based decision-making. Training workshops for decision-makers in year 1 then build and maintain until 2030.

1.1.2.5 Estimation of Resources Needed for Action and Activities

Estimation of capacity building needs

Action 2 from **Table 5** above highlights the need to build the capacity of the staffsin the GIS Unit at MEECC who are currently working in coastal research, monitoring and mapping. This can be done through long and short training opportunities, internships, partnerships with research institutions and reinforcing the climate science program at the University of Seychelles.The capacity building program will need to continue throughout the timeframe envisioned for the TAP from now until 2030.

Estimations of costs of actions and activities

The project would require a budget of around ~SCR 270 million[1] for its implementation. Funding for equipment and software can be sought from international agencies but some costs would need to be borne by the government of Seychelles. These recurrent costs will in some cases be covered under project grants but could be supported by local funding mechanisms such as the Environment Trust Fund (ETF) and Seychelles' Conservation and Climate Adaptation Trust (SEYCCAT), given their relevance to climate change and environmental management.

1.1.2.6 Management Planning

Risks and Contingency Planning

Table 7provides an overview of the main risks to the successful implementation of the TAP for CRMM.

Table 7. Risks associated with the CRMM TAP and their mitigation measures.

Risk	Level	Mitigation
Difficulties in bringing stakeholders together	low	MEECC GIS takes lead on coordination and ensures regular communication with other key partners in coastal data management
Legislation proves difficult to implement and enforce	high	Emphasise value of data sharing through education, training programs and PR and focus on MOU's and other means to promote data sharing
Stakeholders resistant to change	med	Publicize existing studies highlighting predicted climate change impacts to the coast and risks of doing nothing differently
No government funding available to support expansion of GIS Unit	high	Seek support for core funding from SEYCCAT or ETF, and negotiate collaboration/support from DRDM projects and funding

[1] An exchange rate of IUSD = 14 SCR has been used in this report.

Source: TNA project

Next Steps

a) Immediate requirements to proceed

- Allocate staff to focus specifically on coastal risk monitoring, mapping and coordination;
- Set up coordinating committee to engage all stakeholders in coastal data collection and management – focal point MEECC GIS Unit;
- Ensure TAP steps and priorities are in line with MEECC/GIS current plans and priorities;
- Secure funding sources to build up GIS Unit staff and capacity; and
- Secure funding to invest in equipment and hardware.

b) Critical steps to succeed

- Ensure ongoing budget support for GIS unit/coordinating body;
- Focus on building effective communication and coordination with key partners;
- Promote this technology as an essential foundation for all coastal development and planning and integrate it into existing policies, plans, and procedures; and
- Ensure support by decision-makers.

1.1.2.7TAP overview table – Coastal Risk Monitoring and Mapping

The overview of the TAP for CRMM is given in **Table 8**.

Table 8. TAP overview table for Coastal Risk Monitoring and Mapping.

Sector: COASTAL ZONE								
Technology: Coastal Risk Monitoring and Mapping								
Ambition	Mainstream coastal risk monitoring and mapping into planning and coastal development approvals, conduct monitoring and risk mapping on regular basis for vulnerable sites on the three main islands from 2018 to 2030							
Benefits:	Social: improved science education and skills, Environmental: improved planning and protection of coastal infrastructure, Economic: job creation							
Action	**Activities to be implemented**	**Sources of funding**	**Responsible body and focal point**	**Time frame (yr)**	**Risks**	**Success criteria**	**Indicators for Monitoring of implementation**	**Budget per activity (USD)**
Action 1 Investing in coastal monitoring and mapping technologies	1.1 Develop and implement a coastal research protocol with ISO standards for data management	GOS	MEECC – CAMS/GIS	1	Lack of personnel	Research protocol with ISO standards drafted and approved for data management	Minutes of Meetings of stakeholders (committee), drafts approved	3000
	1.2 Invest in equipment and software	Grants	MEECC GIS UNIT	1-3	Funding not secured	Equipment in use	List of equipment and software secured	3,000,000
	1.3Update and maintain all major data sets	Grants (development partners)	MEECC GIS UNIT	1-12	Lack of personnel	Data up to date and accessible	Reports to stakeholder committee, minutes of meetings	2,000,000
	1.4 Map and regularly update coastal risk areas, modeling of impacts	Grant/ GOS	MEECC GIS UNIT	2-12	Lack of personnel	Maps and reports available	Reports to committee	1,500,000
	1.5 Produce annual report	GoS	MEECC GIS UNIT	1-12	Lack of personnel	Report circulated and read	report	36,000[1]
	1.6 Publish scientific papers	GOS /grants	MEECC GIS UNIT	ongoing	Not written, not accepted for publication	1 published paper per year	Committee updates on research status	36,000[2]
Action 2 Building institutional capacity for a national hub for coastal research,	2.1 Restructure the GIS unit and recruit more staff	GOS/grants	MEECC/GIS Unit	1-3	No funding	More responsibility, 3 new staff	Production of reports and data management	10,000,000
	2.2 Staff training	GOS/grants	MEECC GIS Unit	1-12	No funding	1 local workshop per year, 1 overseas, 2	# workshops, # participants, feedback/reports	200,000

monitoring, mapping and reporting						masters		
	2.3 new GIS Unit office space	GOS	MEECC	1-3	No space found, no funding	Larger office for staff and equipment	Staff working from new/ reorganized office	1,000,000
	2.5 Establish national coastal research/science committee	GOS	MEECC GIS Unit	1, ongoing	Difficult to find meeting time	Committee meets bi monthly	Meeting minutes	12,000
	2.6 Increase budget support for monitoring and mapping	GOS/grants	Ministry of Finance	1-12	Funding not found	Annual budget increased	Annual report of GIS section	
Action 3 Revising legislation to ensure data sharing and science-based decision-making	3.1 draft regulations	Grants/GoS	MEECC Legal unit	1-2	Insufficient local technical expertise	Regulations drafted with input from stakeholders	Drafts, notes of input from stakeholders	20,000
	3.2 Approval of new regulations/legislation	GOS	MEECC Legal unit	1-2	Resistance from National Assembly	Regulations are law	Gazette copy of law/regulations	10,000
	3.3 Implement and enforce new legislation	GOS	MEECC Legal unit	2-12	Limited staffing	Regulations effective	reports	24,000
	3.4 Draft and sign Data Sharing Agreements & MOUs with partners	GOS/partners	MEECC Legal unit	1-12	Limited staffing	MOUs in place, data being shared	Copy of document	24,000
Action 4 Building technical expertise through internship program and university partnerships	4.1 Establish MOUs with research institutions	GOS/UniSey / NISTI	MEECC/UniSey	1-12	Resistance/ bureaucracy	3-5 MOUs in placeresearch ongoing	Copy of document	10,000
	4.2 student internships in coastal research	Unisey/grants	MEECC/UniSey	1-12	Funding for remuneration	5 interns per year	Internship reports	120,000
	4.3 Develop & Implement research programs	UniSey, GOS, grants	MEECC/UniSey/NISTI	1, ongoing	Lack of coordination between stakeholders leads to non-identification of research needs	2 programs in place at all time	Research proposals and reports	60,000
	4.4 Enhance UniSey curricula	UniSey, grants	UniSey	1, 5, 10	available Expertise	New curriculum in place	Copy of document	45,000
	4.5 Provide opportunities for Seychellois experts	GOS	MEECC	1-12	Lack of funding or little interest from experts for	1 Seychellois on every project	Research reports	60,000

					internships			
	4.6 Develop international research partnerships	GOS/UniSey	MEECC/UniSey	1-12	Lengthy process	3-5 new research partnerships	Research proposals and reports	12,000
Action 5 Education & awareness program to promote climate science and science-based decision-making	5.1 short training program for parliamentarians	GOS/grant	MEECC/NGOs	1, 5, 10	Timing, getting participation	# participants / +feedback	on climate change science and impacts	15,000
	5.2 short training program for senior managers	GOS/grant	MEECC/NGOs	1, 5, 10	Timing/ getting participation	# participants /+feedback	Workshop reports, media coverage	15,000
	5.3 Support STEM education program	GOS (NISTI)/grants	NISTI / Ministry of Education	1-5	Available expertise, funding, school problems	Materials in use in schools, #teachers trained	curriculum materials, teacher training, equipment for schools	500,000
	5.4 climate change curriculum development for schools	GOS/grants/ NGO funds	Ministry of Education	1-5, 10	Funding, crowded curriculum, bureaucracy	# resources produced in use # teachers trained	curriculum materials, teacher training,	200,000
	5.5 media campaign on climate change science	GOS/grants/ NGO funds	MEECC/NGOs/Media houses	1-12	Available expertise, funding	# programs per year, +ve feedback	Quality of programs feedback from public	360,000

Source: TNA project

Notes:

1 USD 3,600 for one report per year, and budget is for 10 years

2 Budget is for 10 years, and the cost is estimated at USD 3,600 per year for a paper in a prime international journal. A page charge of USD 400 and an average length of article of 9 pages are assumed.

1.1.3Action Plan for Coastal Ecosystem Restoration: Wetlands and Dunes

1.1.3.1 Introduction – Coastal Ecosystem Restoration

Although the degree of severity of coastal erosion and flooding may at times call for fast-acting hard engineering solutions, in many cases these challenges can be dealt with by planning ahead and using natural, ecosystem-based adaptation (EBA) methods for long term adaptation results (Andrade et al., 2011). Natural EBA approaches to coastal protection against the impacts of climate change has many benefits: they are conducive to community involvement, they create and maintain habitat for wildlife, they provide a space for social and leisure activities, and they tend to be more aesthetically pleasing than hard engineering approaches.

However, there are cases where ecosystems are degraded to the point where there is a need for a hybrid approach whereby nature-based adaptation structures (green infrastructure) are enhanced to some degree with hard engineering technologies (grey infrastructure) (Hale et. al., 2009; Nature Conservancy, 2015; Sutton-Grier et al., 2015), for instance with coral reef restoration, or dune rehabilitation.

In Seychelles, urgent problems are generally addressed using hard engineering approaches, such as reconstruction of river outlets in concrete, concrete drainage structures to guide run off of heavy rains from roads or housing estates, walls along river banks to control flooding, seawalls made of rock revetments to reclaim lost land and destruction of roads due to beach erosion.

However, over the last several years, the government of Seychelles has initiated several projects applying softer engineering techniques to control flooding and erosion in coastal areas in a more natural and aesthetically pleasing way.There are several examples of pilot EBA projects addressing wetland fragmentation, mangrove forest degradation, coral reef bleaching and disintegration, and beach erosion. These projects are promising, however none of the actions currently implemented are taking a fully integrative approachdespite the fact that degraded dunes, river outlets, wetlands and coral reefs are often in close proximity. Local experts in the field recognise that this is a shortcoming in the approach taken so far, and agree that Seychelles needs to start addressing EBA coastal measures in a more holistic integrative way.

The TAP will focus on promoting integrated EBA approaches to controlling coastal flooding and erosion, with possible blending of green and grey adaptation structures that, when combined,will protect the coasts, and maintain the integrity and aesthetic beauty of Seychelles' coastal areas.The TAP combines two related EBA technologies (wetland restoration and dune rehabilitation) identified through the MCA process of the technology needs assessment (Republic of Seychelles, 2017a). The Barriers Analysis undertaken revealed that the necessary measures and enabling framework for these similar technologies had numerous overlaps (Republic of Seychelles, 2017b), and these have now been merged as one technology (coastal ecosystem restoration). The sites chosen for action under the TAP are selected from priority sites identified in several studies of vulnerable coastal areas undertaken in recent years (JICA, 2013; Khan, 2015; Mendez et al., 2013), considering areas at risk from flooding and coastal erosion due to climate change.The vulnerable sites selected for inclusion are as follows:

1. Dunes: 4 vulnerable sites have been selected, two are on Mahé and two are on Praslin - Cote D'Or and Grand Anse on Praslin, Baie Lazare and Beau Vallon on Mahé; and
2. Wetlands: 9 vulnerable sites have been selected and they are all on Praslin and they include: Baie Ste Anne village, Grand Anse village, Anse Kerlan, Nouvelles Decouvertes, Anse St. Saveur – Anse Takamaka, Au Cap Wetlands, Anse Gouvernement, Cap Samy and Cote D'or

Annex 1provides a summary of the technology for this TAP, including details of stakeholders involved in the coastal zones technical working group, the sustainable development benefits of coastal ecosystem restoration, and status of the adaptation technology in Seychelles.

1.1.2.2 Ambition for the TAP for Coastal Ecosystem Restoration

The TAP seeks to support integrated coastal ecosystem restoration at ten vulnerable wetland and dune sites: two on Mahé (Baie Lazare, Beau Vallon) and eight on Praslin (Cote d'Or, Grand Anse, Baie Ste Anne, Cap Samy, Anse Kerlan, Nouvelles Decouvertes, Au Cap, Anse St Saveur/Takamaka, Anse Gouvernement). Each site will require studies, consultation with stakeholders, and development and implementation of a rehabilitation plan addressing the affected degraded ecosystems in an integrated way.

1.1.2.3 Actions and Activities selected for inclusion in the TAP

This section provides a discussion of the Actions and Activities that have been selected to inclusion in the TAP for Coastal Ecosystem Restoration..

Summary of barriers and measures to overcome barriers

Table 9provides a summary of the identified barriers and measures for coastal ecosystem restoration, derived from the TNA Barriers Analysis and Enabling Framework Report (Republic of Seychelles, 2017b). The barriers and measures from the two related technologies (wetland and dune restoration) had many synergies and have been combined under one technology: coastal ecosystem restoration.

Table 9. Overview of barriers and measures to overcome these for Coastal Ecosystem Restoration.

Categories	Identified barriers	Measures to overcome barriers
Economic and financial	• Value and ownership of coastal land • Limited public investment in coastal ecosystem restoration using EBA methods	• Introduce financial incentives for property owners to promote restoration of wetlands, dunes and other coastal ecosystems • Explore strategies to invest in coastal ecosystem protection and fund coastal ecosystem restoration projects
Legal and regulatory	Inadequate government policies and legislation regarding protection, and restoration of coastal ecosystems	• Policy and legal reform
Network structures	Lack of coordination between stakeholders	• Improve Coordination among stakeholders
Institutional and organizational capacity	Weak institutional set up	• Improve Institutional Set up
Human skills	Limited Technical Expertise	• Build technical expertise in coastal ecosystem restoration and EBA
Information and awareness	• Lack of confidence in natural coastal rehabilitation measures • Lack of awareness among planners and policy makers of the need for long-term planning and natural coastal rehabilitation measures • Limited information on climate change and the importance of coastal ecosystems	• Improve policy and decision-makers understanding of EBA and soft engineering methods to protect the coast • Improve awareness of climate change and EBA methods to protect the coast
Technical	Limited literature and information on wetland restoration in island ecosystems using an EBA approach	• Undertake research and share knowledge with other SIDS

Source: Republic of Seychelles, 2017b

Actions selected for inclusion in the TAP (Coastal Ecosystem Adaptation)

Table 10provides an assessment of the measures considered for inclusion in the TAP.The measures are based on the problem/objective trees from the BAEF Report and have already been identified as critical for inclusion in the TAP (Republic of Seychelles, 2017b). The factors used to assess each measure are cost effectiveness, efficiency, interactions with other measures, suitability, and benefits/costs (UNFCCC & UDP, 2017), and are used together to assess the urgency to implement a measure; lower rankings are given for measures that are already being partially addressed under existing projects or programs.

Table 10. Assessment of measures for Coastal Ecosystem Restoration.

Measures to overcome barriers	Assessment	Ranking
Financial barriers Introduce financial incentives for property owners to promote restoration of wetlands, dunes and other coastal ecosystems	This barrier is crucial to get stakeholders on board but will be challenging and new for Seychelles. Can be incorporated into the GCCA+ climate finance plan for Seychelles being initiated now. However it could be combined as a measure with the next measure (to explore investment strategies) and be reformulated as an activity.	high
Financial barriers Explore strategies to invest in coastal ecosystem protection and fund coastal ecosystem restoration projects	This measure is already being done and resources are in place to continue to explore this, particularly under the new revised climate change strategy and financing plan. What is lacking are the financial resources to plan and undertake restoration works in degraded and vulnerable areas of the coast. Studies undertaken under Technology 1 (coastal risk mapping and monitoring) will ensure efficient use or resources targeting the most vulnerable sites, and pre-empting incidents of coastal damage.	high
Legal and regulatory barrier Policy and legal reform	The policy work can be incorporated into the CC national policy/strategy revisions; legal reform will be challenging as need to work with multiple sectors, but can be done with commitment from Planning sector.	med
Network failure Improve coordination among stakeholders	This measure will be challenging but absolutely critical. Will need more resources within MEECC to build their capacity to undertake this role effectively. Absolutely critical to reinstate national climate change committee, an effective way of soliciting communication and engagement among stakeholders.	high
Institutional and organizational barrier Improve institutional Set up	Closely linked to the above measure, MEECC needs more resources and staff to effectively lead and coordinate and communicate with partners. They are already leading several initiatives but will benefit from strengthening coastal/climate adaptation section.	high
Human capacity barrier Build technical expertise in coastal ecosystem restoration and EBA	Very feasible and already underway with support from current EBA projects, and UniSey environmental science programme.	high
Information and awareness barrier Improve policy and decision-makers understanding of EBA and soft engineering methods to protect the coast	This can be done through short workshops and in collaboration with current EBA projects and UniSey. Very feasible. It can be merged with the following awareness measures and listed as a separate activity.	med
Information and awareness barrier Improve awareness of climate change and EBA methods to protect the coast	There is ongoing awareness, needs coordination and to target key people, not just general public but also decision-makers and stakeholders doing business or living in vulnerable coastal areas.	med
Technical barrier Undertake research and share knowledge with other SIDS	Many projects are underway but these are not always framed as research nor are their results published. Research and knowledge sharing in academic and non-academic circles can easily be built into EBA coastal projects.	high

Source: TNA project

Following this assessment, all the measures from **Table 10**will be included as Actions in the TAP for Coastal Ecosystem Restoration.However, the corresponding Actionshave been slightly reorganised to facilitate implementation (**Table 11**).

Table 11. Final selection of measures to be included as actions in TAP for Coastal Ecosystem Restoration.

Categories	Identified measures to overcome barriers (from Table 9)	Measures selected as Actions for inclusion in TAP (from Table 10)
Economic and financial	• Introduce financial incentives for property owners to promote restoration of wetlands, dunes and other coastal ecosystems • Explore strategies to invest in coastal ecosystem protection and fund coastal ecosystem restoration projects	• Explore strategies to promote investment in coastal ecosystem protection and fund coastal ecosystem restoration projects by public and private sectors
Legal and regulatory	• Policy and legal reform	• Policy and legal reform
Network structures	• Improve Coordination among stakeholders	• (see institutional capacity)
Institutional and organizational capacity	• Improve Institutional Set up	• Improve Institutional set up and organizational capacity to coordinate and lead coastal ecosystem restoration
Human skills	• Build technical expertise in coastal ecosystem restoration and EBA	• Build technical expertise in coastal ecosystem restoration and EBA
Information and awareness	• Improve policy and decision-makers understanding of EBA and soft engineering methods to protect the coast • Improve awareness of climate change and EBA methods to protect the coast	• Improve policy and decision-makers understanding of EBA and soft engineering methods to protect the coast • Improve awareness of climate change and EBA methods to protect the coast
Technical	• Undertake research and share knowledge with other SIDS	• Undertake restoration projects as research and share knowledge with other SIDS

Source: TNA project

Activities identified for implementation of selected actions

Table 12 details the Activities for each Action (previously referred to as measure) for inclusion in the TAP for Coastal Ecosystem Restoration.

Table 12. Identification and description of specific Activities to support Actions for Coastal Ecosystem Restoration.

Summary of Actions	
Action 1:	**Explore strategies to promote investment in coastal ecosystem protection and fund coastal ecosystem restoration projects by public and private sectors**
Action 2:	**Policy and legal reform**
Action 3:	**Improve Institutional set up and organizational capacity to coordinate and lead coastal ecosystem restoration**
Action 4:	**Build technical expertise in coastal ecosystem restoration and EBA**
Action 5:	**Improve awareness and understanding of climate change and EBA methods to protect the coast among key stakeholders**
Action 6:	**Undertake restoration projects as research and share knowledge with other SIDS**

Activities for Action implementation	
Action 1:Explore and develop strategies to promote investment in coastal ecosystem protection and fund coastal ecosystem restoration projects by public and private sectors	
Activity 1.1	Developa framework for cost-sharing among stakeholders to protect vulnerable coastal sites
Activity 1.2	Packaging financial incentives such as grants schemes, CSR or other tax breaks for businesses / hotels to pay for conservation and restoration of vulnerable coastal ecosystems on their property
Activity 1.3	Apply to international donors and lending institutions for financial support (grants/loans) to cover costs of technical expertise and restoration works or equipment
Activity 1.4	Allocate more public funds to support coastal restoration projects.
Activity 1.5	Provide grant support for coastal ecosystem restoration projects initiated by NGOs and community groups.
Activity 1.6	Partner with universities and research institutions overseas to share costs of coastal EBA pilot projects and studies.
Action 2: Policy and legal reform	
Activity 2.1	Strengthen the Environment Protection Act and its enforcement in terms of protection and restoration of coastal ecosystems particularly wetlands and dunes, including setbacks
Activity 2.2	Introduce or integrate policy measures that reflect a multi-sectoral EBA and ICZM approach to coastal protection
Action 3: Improve Institutional set up and organizational capacity to coordinate and lead coastal ecosystem restoration	
Activity 3.1	Institutional strengthening of the Coastal Adaptation and Management Section (CAMS) to carry out effective coordination of stakeholders
Activity 3.2	Appoint a full time coastal EBA officer responsible for overseeing coastal restoration activities on Praslin/La Digue and another for Mahé
Activity 3.3	Reinstate the national Climate Change Committee and set up an EBA subcommittee to coordinate initiatives and provide a forum for communication and coordination among stakeholders leading EBA projects
Action 4:Build technical expertise in coastal ecosystem restoration and EBA	
Activity 4.1	Enhance UniSey environmental science curriculum on climate change and coastal ecosystem restoration
Activity 4.2	Providing internship opportunities for students to participate in all phases of coastal ecosystem protection and restoration projects
Activity 4.3	Bring international expertise to work alongside and train local experts/staff;
Activity 4.4	Engage local expertise in development and implementation of coastal ecosystem restoration projects where capacity exists
Activity 4.5	Provide opportunities for Seychellois to undertake post-graduate studies in coastal EBA methods
Action 5: Improve awareness and understanding of climate change and EBA methods to protect the coast among key stakeholders	
Activity 5.1	Hold training sessions in climate change and coastal EBA methods for protecting the coast, targeting policy makers, senior engineers and planners, Hold a workshop including site visits for politicians focused on climate change, impacts on the coast, predictions for Seychelles, and measures to protect the coast
Activity 5.2	Hold training sessions in climate change and EBA for affected communities and other stakeholders such as local businesses, hotels, etc.
Activity 5.3	Hold participatory information and working sessions/meetings to involve stakeholders (community, businesses, schools, etc.) in all stages of coastal restoration projects.
Activity 5.4	Integrate climate change adaptation, including EBA into the national curriculum and produce educational teaching/learning resources, and provide opportunities for schools to be involved in coastal restoration works
Activity 5.5	Plan and implement media campaigns for the general public on climate change impacts on coastal areas, and how coastal ecosystems can help protect the coast
Activity 5.6	Share information about climate change and coastal ecosystems using posters, website and social media
Activity 5.7	Hold site visits and open days for the public to pilot project sites using coastal ecosystem based restoration

Action 6: Undertake restoration projects as research and share knowledge with other SIDS	
Activity 6.1	Plan and implement ecosystem restoration actions at key vulnerable wetland and dune sites in collaboration with stakeholders, enhancing public green space for benefit of the local community, based on sound knowledge of coastal dynamics
Activity 6.2	Provide funding support for Seychellois to undertake research, publish and share findings related to coastal ecosystem restoration projects at relevant regional and international conferences
Activity 6.3	Organise and host an international conference on coastal EBA in SIDS in Seychelles

Source: TNA project

Actions to be selected as Project Ideas

All of the above Actions (measures) are integrated and should be included in the TAPtogether. The approach for selecting Actions or Activities for inclusion in PIs is the same as that used for the CRMM TAP. The PIs will include:

- Education and awareness activities and /or workshops for decision-makers;
- Policy and legal reform to strengthen the EPA in terms of protection of wetlands, dunes and other coastal ecosystems; and
- The International conference on coastal EBA could be done as a stand alone project idea given that several projects are already underway in Seychelles and there is much to share and still to learn.

1.1.2.5 Stakeholders and Timeline for implementation of TAP

Overview of stakeholders for the implementation of the TAP

The roles of the key stakeholders for the implementation of the TAP for Coastal Ecosystem Restoration are listed in **Table 13**.

Table 13. Role of stakeholders in the implementation of the TAP for Coastal Ecosystem Restoration.

Key Stakeholders	Role
Ministry of Environment, Energy and Climate Change	Overall lead for project, particularly CAMS Improve institutional set up for coastal EBA and coordination among stakeholders, lead legal and policy reform, support education and training programs, lead coordination and supervision of restoration works
Ministry of Foreign Affairs	Seek grants and other support to fund protection and restoration of coastal ecosystems as adaptation to climate change, in collaboration with MEECC
Ministry of Finance	Allocate budget to support upgrading of MEECC CAMS, develop financial incentives to support coastal EBA as a measure to protect the coast from climate change
Ministry of Habitat, Infrastructure and Land Transport	Partner with MEECC on legislative and policy reform favouring coastal protection and EBA
University of Seychelles	Build technical expertise in coastal ecosystem restoration, participate in restoration projects and research, coordinate national conference on EBA in SIDS
Ministry of Education	Coordinate curriculum development and teacher training
Civil Society Organisations	Undertake restoration and research projects with community stakeholders, assist with education campaign, provide input and support for policy reform and training, participate in national conference
Landowners and coastal businesses	Allocate land and/or funds for coastal protection and restoration, contribute funds, participate in planning, implementation and supervision of projects
Media Houses	Assist with education campaign and dissemination of information, media coverage of restoration projects

Source: TNA project

Scheduling and sequencing of specific Activities

A more detailed timetable for the Activities can be found in the TAP overview table (**Table 15**). This TAP is planned for implementation over a twelve year period (2018-2030). However, for the six actions envisioned under this TAP for Coastal Ecosystem Restoration, the sequencing would be approximately as follows:

- **Action 1: Explore strategies to promote investment in coastal ecosystem protection and fund coastal ecosystem restoration projects by public and private sectors.** This action must begin urgently in year one in terms of finding innovative funding sources. Project/grant writing can continue throughout until 2030 as opportunities arise.
- **Action 2: Policy and legal reform. Some work has already been initiative in terms of revisions to the wetland policy and the EPA.** These should be consolidated and adopted, ready for enforcement by year 3.
- **Action 3: Improve Institutional set up and organizational capacity to coordinate and lead coastal ecosystem restoration.** This must be done urgently within the first 2-3 years. Without institutional improvement, the coordination and supervision of coastal EBA activities will be severely undermined.
- **Action 4: Build technical expertise in coastal ecosystem restoration and EBA.** This has already begun with the inclusion of coastal and climate science in the UniSey environmental science program, but more needs to be done on an ongoing basis until 2030 and beyond to continue improving this program and developing opportunities for professionals already in the field to upgrade their knowledge and expertise.
- **Action 5: Improve awareness and understanding of climate change and EBA methods to protect the coast among key stakeholders.** Similarly, some work has already been initiated in this field for the general public and schools, and this can be maintained throughout until 2030. However there is an urgent need in year 1 to ensure that decision-makers, planners and engineers have participated in training and site visits to help them understand the urgency of protecting the coast and the role of coastal EBA vs hard engineering methods. This should be repeated around year 5 for new personnel.
- **Action 6: Undertake restoration projects as research and share knowledge with other SIDS.** There are already several coastal EBA projects underway which will require maintenance throughout the time frame. It is envisioned that at least one new coastal EBA project will be initiated each year over 12 years at vulnerable dune and wetland hotspot sites. Each project will take from 1-3 years to implement depending on the scale of work needed at each site. An international conference on coastal EBA should take place around year 3, to allow Seychelles to share experience as well as gain new insights and approaches prior to undertaking further projects.

1.1.2.5 Estimation of Resources Needed for Action and Activities

Estimation of capacity building needs

The TAP for Coastal Ecosystem Restoration relies heavily on a commitment to building up and supporting local technical expertise who are skilled in planning, design and execution of coastal ecosystem restoration works. Although capacity building can be seen as a cross-cutting issue and practiced through learning-by-doing during the implementation of any Action/Activity, the TAP builds in a dedicated capacity building component (Action 4). The University of Seychelles already has integrated coastal science and climate change into the Environmental Science BSc program, but there will be a need to support post-secondary studies in the field of coastal EBA. The CAMS section of MEECC has the mandate to plan and oversee coastal EBA projects but will need greater budgetary support to build and maintain a high quality team of skilled, professional coastal restoration experts able to effectively lead EBA projects.

Estimations of costs of actions and activities

The project would require a total budget of around USD 6.6 million or SCR 93 million for its implementation over a twelve year period. Grant funding can be sought from international agencies

(e.g. Green Climate Fund)to secure the necessary funds for implementation of restoration work and supporting measures. Some costs would need to be borne by the government of Seychelles but could be supported by local funding mechanisms such as the ETF and SEYCCAT.

1.1.2.6 Management Planning

Risks and Contingency Planning
Table 14provides an overview of the key foreseen risks to successful implementation of the TAP for Coastal Ecosystem Restoration, and suggested strategies for mitigation.

Table 14. Risks associated with the TAP and their mitigation measures.

Risk	Level	Risk Mitigation
Reluctance or opposition of stakeholders	med	Initiate education campaign in first phase
Restoration works compromised by extreme flooding or erosion events	med	Consider hybrid approaches for repair works, including breakwaters for beaches
Delays with legislation	high	Initiate in first phase, ensure wide consultation and buy in of stakeholders who will be affected, and prior training sessions for decisionmakers
Restoration works poorly executed	med	Ensure design based on detailed coastal dynamics studies undertaken prior to project initiation Choose experienced contractor and consider design and materials not only lowest cost. Ensure supervision of works by qualified technical personnel.
No increase in budgetary support for CAMS	High	Seek sustainable funding sources under local and international funding schemes, including CSR

Source: TNA project

Next Steps

a) Immediate requirements to proceed.
For TAP implementation to take place effectively, several immediate steps are required as follows:

- Quick win Actions: Move quickly on actions such as legislative reform and education/training programme that require less financial commitment, and already have a foundation. These actions will pave the way for implementation of restoration works and other activities in the TAP;
- Political support: It must be ensured that the TAP is in line with any new strategic and action plans being initiated by MEECC and CAMS. This will provide strong policy or political support for the TAP;
- Institutional support: As discussed above, there are numerous stakeholders that are concerned by adaptation interventions in the coastal zones. For the successful implementation of the TAP, it will be necessary to obtain the buy-in from these stakeholders at an early stage. This can be achieved by the MEECC taking the lead to set up a multi-stakeholder steering committee for overseeing the implementation of the TAP and PIs. Further, the TAPs should be included in the work programme of the NDC review process that is expected to start in 2018; and

b) Critical steps to succeed.
The successful implementation of the TAP will rely on three critical steps, namely:

1. Meeting and communicating regularly with key stakeholders to coordinate activities. As mentioned above, the setting up of a cross-sectoral multi-stakeholder steering committee can be used as a vehicle for communications. Close coordination of stakeholder will also serve to either avoid duplication or build synergies with ongoing or planned adaptation initiatives;

2. None of the activities proposed in the TAP can be implemented without financial resources. A critical step is therefore to secure funding to upgrade technical capacity of CAMS and to recruit specialised EBA staff; and
3. Given that Seychelles is constrained by its small pool of human capital, a critical element of the TAP is to build research and knowledge sharing into all components of the project. This will contribute towards increasing technical expertise and to showcase Seychelles' experience in coastal EBA.

1.1.2.6 TAP overview table – Coastal Ecosystem Restoration

The overview of the TAP for Coastal Ecosystem Restoration is given in **Table 15**.

Table 15. TAP overview table for Coastal Ecosystem Restoration.

Sector: COASTAL ZONE								
Technology: Coastal Ecosystem Restoration								
Ambition	**To protect and restore vulnerable coastal ecosystems on Mahé and Praslin, with a focus on dunes and wetlands that are not being addressed on other restoration projects.**							
Benefits:	Social: improved public use of coastal areas, Environmental: ecosystems restored and protected, Economic: job creation and protection of coastal resources for tourism							
Action	**Activities to be implemented**	**Sources of funding**	**Responsible body and focal point**	**Time frame (yr)**	**Risks**	**Success criteria**	**Indicators for Monitoring of implementation**	**Budget per activity (USD)**
Action 1. Explore and develop strategies to fund coastal ecosystem restoration and protection by public and private sectors	1.1 Develop framework for diverse financial incentives to fund coastal EBA projects on public and private lands	GOS/grant	MEECC	1-3	Lack of technical expertise, political resistance	Incentives in place	Minutes of meetings with stakeholders, proposals, and implemented schemes	5000
	1.2 Diversify funding sources through application of proposals and other sources of funding from local and international donors	GOS	MEECC /MFA	1-12	Lack of technical expertise to write proposals	Grant funding approved	Number of proposals formulated, approved and submitted for funding consideration	24,000
	1.3 Allocate more public funds for coastal restoration projects.	GOS	Ministry of Finance	1	No funding, low priority	budget increase maintained	Increase in national and MEECC budget allocation for CAMS	1,200,000
	1.4 Provide grants for coastal restoration projects initiated by NGOs and community groups.	Grants/ GOS	MEECC/ Ministry of Finance	2-12	No funding, priority given to government led projects	5 grants for 10K USD awarded per year	Successful implementation of projects and sharing of findings	550,000
	1.5 Partner with universities and research institutions overseas to share costs of coastal EBA pilot projects and studies.	GOS/UniSey	UniSey/ MEECC	1-12	Overseas universities have different research agenda	1 new partnership / project per year	Project proposals co-written and co-funded	60,000

Action 2. Policy and legal reform	2.1 Strengthen EPA and its enforcement for protection and restoration of coastal ecosystems particularly wetlands and dunes, including setbacks	Grants/GoS	MEECC Legal unit	1-3	Resistance, lack of coordination between laws/policies	new regulations developed and passed	New regulations for the coastal ecosystems adopted and enforced	50,000
	2.2 Introduce or integrate policy measures that reflect a multi-sectoral EBA and ICZM approach to coastal protection	GOS	MEECC Legal unit	1-3	Lack of coordination between stakeholders	stakeholders using guidelines	Integrated into new climate change policy,	20,000
Action 3. Improve Institutional set up and organizational capacity	3.1 Improve the set-up, functioning and technical expertise of the Coastal Adaptation and Management Section (CAMS).	GOS	MEECC	1-2 then ongoing	Resistance to change, technical expertise	Stakeholders consulted, CAMS studied, recommendations made	Consultant report with recommendations	5,000
	3.2 Appoint 2 full time coastal EBA officers responsible for overseeing coastal restoration activities on Praslin/La Digue and another for Mahé	GOS/grants	MEECC CAMS	1 -12	Technical expertise not available	EBA projects coordinated and reports shared with EBA committee	Annual reports	600,000
	3.3 Reinstate the national Climate Change Committee and set up an EBA subcommittee	GOS/grants	MEECC	1 -12	Difficult coordinating stakeholders	# meetings per year, diversity of stakeholder members	Minutes of meetings Coordinated actions	12,000
Action 4. Build technical expertise in coastal ecosystem restoration and EBA	4.1 Enhance UniSey environmental science curriculum on CC / coastal EBA	UniSey/grants	MEECC/ UniSey	1-3, then ongoing	Availability of technical expertise to develop and teach	10 students graduate each year with expertise in coastal EBA and CC	Curriculum documents # dissertations related to coastal EBA	200,000
	4.2 Provide student internship opportunities in coastal EBA	GOS/grants	MEECC/ UniSey	1-12	Insufficient supervision	2 UniSey student interns annually (1 month)	Internship reports from interns and hosts	25,000
	4.3 Bring international expertise to work alongside and train local experts/staff	Grants for EBA projects	MEECC/ UniSey	1-12	Availability of funding, attitudes	Local consultants given first priority, international experts always	Project proposal docs and reports	-

						attached to Seychellois counterpart		
	4.4 Engage local expertise in development and implementation of coastal EBA	GOS, grants for EBA projects	UniSey	1-12	Lower pay rates for local expertise	Seychellois experts leading projects and paid at comparable rates	Project docs and reports	-
	4.5 Provide scholarships for post-graduate studies in coastal EBA methods	GOS/ grants/ overseas universities	MEECC	1-12	Lack of interest among candidates, lack of funding	Support at least 5 masters degrees and 2 PhDs	Copy of dissertation, research presentations /publications	250,000
Action 5. Improve awareness and understanding of climate change and EBA methods to protect the coast among key stakeholders	5.1 training sessions for policy makers, politicians, senior engineers and planners	GOS/grant	MEECC/ NGOs	1, 5	Lack of interest or participation	25 participants per workshop in yr 1 and 5 Hands on, include site visit	Workshop reports media coverage feedback	20,000
	5.2 training sessions in CC and EBA for local stakeholders	GOS/grant	MEECC	1 -12	Lack of interest or participation	1 workshop per project site, 25 participants	Media coverage, workshop report	30,000
	5.3 Hold participatory information and working sessions/meetings for stakeholders in EBA projects	GOS/grant	MEECC	1-12	Lack of interest or participation	1 session quarterly at each site thru duration of EBA project	Minutes of meetings, photos	60,000
	5.4 Integrate CC adaptation and EBA into the national curriculum, produce support materials and coordinate field trips/involvement of schools	GOS/grant	Ministry of Education	1-5	Curriculum crowding	Curriculum updated, and support materials produced with input from teachers, 12 field trips/yr	Curriculum and support materials Field trip reports	120,000
	5.5 media campaigns on CC and EBA targeting general public	GOS/grant	MEECC / NGOs	1-12	No one sees programs	1 documentary / year 5 adverts all online, newspaper and news coverage	Copies of media coverage documented	120,000
	5.6 information on CC and EBA on social media and posters	GOS/grant	MEECC/n go's	1-12	Website not updated, information not	Website launched with all info & resources available	Website running Resources available	60,000

					current or interesting	& links to projects Info up to date		
	5.7 site visits and open days for the public at EBA sites	GOS	Ministry of Education	1-12	No one attends	20 participants, 5 per year, well-advertised	Reports, media coverage	12,000
Action 6. Undertake restoration projects as research and share knowledge with other SIDS	6.1 Plan and implement restoration actions at key vulnerable coastal wetland and dune sites, based on sound knowledge of coastal dynamics	Grants	MEECC	1-12	Restoration poorly designed, lack of community buy in, funding and technical expertise limited	Participatory planning process, 1 EBA project initiated per year, 13 projects completed at vulnerable sites	Project reports, photos, media coverage, data on shoreline protection and wetland functionality	3,000,000
	6.2 Provide funding support for research and publishing	GOS/grant	UniSey / MEECC	1-12	Articles not published	1 article published per yr, support given to authors	Copies of publications and research reports, coastal EBA project progress reports	60,000
	6.3 Organise and host an international conference on coastal EBA in SIDS in Seychelles	GOS/grant/UniSey	UniSey/ MEECC	Yr 3	Funding, lack of interest/attendance by other countries	100 participants from at least 10 countries 20 Travel grants for students/ CSOs	Conference proceedings media coverage	65,000

Source: TNA project

1.2 Project Ideas for the Coastal Zone Sector

1.2.1 Brief summary of the Project Ideas for the Coastal Zone Sector

The TAPs described in this document are designed with specific Actions and Activities in mind that are interrelated and will together contribute to the successful application of the proposed technologies.However, there are two components of both TAPs that complement each other and could be extracted and developed as PIs which can be implemented quickly, while waiting for the larger funds needed to implement the more substantial parts of each action plan. Importantly, the PIs contain activities that provide an enabling framework that is supportive of multiple adaptation technologies in the Coastal Zone Sector. There is also one activity under the TAP for Coastal EBA, which could be implemented as a PI. These project ideas are:

1. **Project Idea 1 - Climate change education & training:**Climate change education, awareness and training were identified as a key measure under several of the technologies proposed for protecting the coast against climate change. The national climate change policy included measures for CC education and training but many activities were not funded. This project idea is based on the climate change education and training strategy; and
2. **Project Idea 2 - Legal and policy reform:**Seychelles is generally known to have good environmental laws and policies which are under regular revision. One of the greatest challenges is ensuring harmonisation among different legal instruments to ensure protection of the environment and that loopholes are eliminated. Under the two TAPS developed under the Coastal TNA process, both identified legal and policy inadequacies as barriers to the adoption of EBA based technologies to protect the coast.

These three project ideas are elaborated below. They are based on the information from the TAP summary tables for each technology – i.e. **Table 8** and **Table 15**.

1.2.2 Specific Project Ideas

The PIs for the Coastal Zone sector are summarised in **Table 16** and **Table 17**.

Table 16. Project Idea 1: Climate Change Education & Training.

Introduction/Background	Climate change education, awareness and training were identified as a key measure under several of the technologies proposed for protecting the coast against climate change. The national climate change policy included measures for CC education and training but many activities were not funded. This project idea is based on that climate change education and training strategy.
Objectives	1. To increase understanding of climate change and the risks facing Seychelles among all levels of the population 2. To contribute to a shift towards science based decision-making for coastal protection measures 3. To ensure that Seychelles has sufficient technical expertise to monitor climate changes, study and predict impacts, and to protect coastal infrastructure sustainably
What are the outputs and are they measurable?	1. Improve climate change and science content and delivery in the national curriculum at all levels 2. Update the climate change content in relevant UniSey program curricula 3. Provide climate change training for decisionmakers, senior managers and other relevant target groups 4. Provide opportunities for professional development and post-graduate studies for Seychellois working in the field of climate change and the coast. 5. Ensure that up to date information and resources on climate change are available for educators, students and the public
Relationship to the country's sustainable development	Climate change adaptation and protection of the coast are key priorities of the government of Seychelles. Climate change education and training were identified as national priorities in the national Climate Change Strategy (2009)

priorities	
Project Deliverables e.g. Value/Benefits/ Messages	1. An educated populace that understands climate science, how climate change will affect them and what we can do 2. Availability of publications, media productions, information online and other resource materials to promote climate and science literacy in one online clearinghouse 3. Field trips and/or site visits for school groups and the public to climate change project sites in the coastal zone 4. 2 Seychellois students undertaking a Masters degree in climate change adaptation in the coastal zone
Project Scope and Possible Implementation	The project can build on current and past climate change education efforts targeting schools, the general public and decision-makers and should be derived from the national climate change strategy as well as the revision soon to be underway. It is a national project and broad in scope but has potential to reach a large segment of the population through use of local media houses and the internet.
Project activities	1. Develop new climate change resource materials for secondary schools with emphasis on adaptation in general and specifically on the coast. 2. Offer teacher training to promote the resources 3. Offer climate change workshops for post-secondary school science students 4. Conduct climate science workshops for members of the national assembly, decision-makers and senior technicians in relevant fields 5. Plan and implement a media campaign to teach the general public about basic climate science, how Seychelles will be affected, and what we need to do to adapt and mitigate 6. Develop a website to act as a clearinghouse for all climate education and training resource materials and productions including contributions from government agencies, CSOs and other groups. 7. Provide 2 scholarships for Seychellois to study coastal climate science at Masters level overseas.
Timelines	This project is envisioned for implementation within a two-year timeframe.
Budget/Resource requirements (What is the budget? How is the project to be funded? /Staff, Engaging consultants, partnership, etc.)	1. The budget would be about USD200,000 and this would need to be funded through a project grant, although in-kind co-funding and involvement of staff could be provided from the government of Seychelles. 2. The project would be coordinated by the MEECC but some activities could be subcontracted to local NGOs or consultants (e.g. training programs, curriculum development) 3. The scholarships would need to be coordinated by the MEECC in collaboration with the Agency for National Human Resource Develop (ANHRD) 4. The clearinghouse could be hosted on the MEECC website but would need to be coordinated with other climate change education stakeholders in Seychelles 5. The Environmental Education Association of Seychelles regroups professionals involved in different aspects of education for sustainability in Seychelles and could be engaged as a consultant group to coordinate the project if the MEECC does not have the immediate capacity
Measurement/Evaluation (What tangible evaluation of accomplishments will be conducted? How will the success be measured?)	Education and awareness are long term initiatives that often take years to reveal the results. However, the following methods can be used to evaluate results: 1. Evaluation and feedback from participants in workshops, including what they will do differently as a result of the training 2. A survey of the use of the climate change resources by schools 3. Survey of the general public at the beginning and end of the project to determine their awareness of and concern about climate change 4. Keeping track of visits to the website and # downloads of resources 5. Feedback and dissertations from the masters students
Possible Complications/ Challenges	Limited human resources at MEECC to coordinate Managing project funding through government treasury is slow and bureaucratic Coordination of stakeholders is time consuming
Responsibilities and Coordination	Ideally the MEECC public education unit would coordinate this project, but in collaboration with other key stakeholders, such as the Ministry of Education, local NGOs, and other government agencies already engaged in climate change education. Each activity could be delegated to a stakeholder organisations e.g.

	1. CC materials and teacher training for schools – Ministry of Education. 2. CC workshops for post-secondary, national assembly and decision-makers – Sustainability for Seychelles with MEECC 3. Media campaign – MEECC with Seychelles Media Association 5. Clearinghouse website – MEECC with other partners 6. Give scholarships for Masters degree – MEECC with ANHRD

Source: TNA project

Table 17. Project Idea 2: Update policy and legislation to enhance protection of the coast.

Introduction/ Background	Seychelles is generally known to have good environmental laws and policies which are under regular revision. One of the greatest challenges is ensuring harmonisation among different legal instruments to ensure protection of the environment and that loopholes are eliminated. Under the two TAPS developed under the Coastal TNA process, both identified legal and policy inadequacies as barriers to the adoption of EBA based technologies to protect the coast.
Objectives	1. Finalise and approve updated wetland policy 2. Introduce EPA regulations protecting coastal ecosystems, requiring coastal dynamic studies/data for all developments, and defining setbacks 3. Introduce new data sharing protocol for vulnerable coastal sites
What are the outputs and are they measurable?	1. New EPA regulations in place defining setbacks for construction near beaches, coastal rivers and wetlands 2. Wetland policy in application 3. Wide awareness of policy and regulations among developers and planners
Relationship to the country's sustainable development priorities	This project ties in with the current national climate change strategy, the sustainable development strategy and the existing Environment Protection Act. The aim is simply to give these more depth and clout to ensure protection of coastal ecosystems, while at the same time allowing sustainable developments in coastal areas. Protecting the coast using soft engineering and EBA approaches will allow Seychelles to continue to flourish as a tourism destination that relies on the aesthetic beauty of its beaches.
Project Deliverables	1. Draft regulations for coastal protection under EPA developed through consultation with stakeholders 2. Regulations approved and gazetted 3. Consensus and adoption of wetland policy
Project Scope and Possible Implementation	The wetland policy is already under revision but has faced challenges. There is a need for better coordination with the Town and Country Planning Act to ensure harmonisation, and also with guidelines available for coastal tourism investors. The project would take about 2-3 years for implementation.
Project activities	1. Hire legal consultant to draft documents (Wetland Policy and EPA regulations) with input from stakeholders and incorporate revisions 2. 2 Stakeholder consultation workshops 3. Review and adoption of documents by Cabinet of Ministers (and National Assembly)
Timelines	The project should be implemented within 2 years
Budget/Resource requirements (What is the budget? How is the project to be funded? /Staff, Engaging consultants, partnership, etc.)	The project would require external grant funding. It could be partially funded through CTCN if an international consultant were required, but this person should work in close consultation with existing expertise in the country, paid through a different fund. Possibly sources of external funding: Ramsar small grants fund, ETF, SEYCCAT, GEF, MFF The total cost of the project would be approximately USD 60,000 1. Legal consultant fees – USD 50,000 2. 2 Workshops – USD 5,000 3. Incidental expenses – USD 5,000
Measurement/ Evaluation	Success will be measured based on whether the outputs have been achieved.
Possible Complications/ Challenges	Difficulties getting consensus on regulations and policy, conflict with other legislation and economic development priorities, lack of technical expertise.
Responsibilities and	This project would be led and coordinated by the Legal unit in the Ministry of Environment, Energy and Transport, but in close coordination with the Planning

Coordination	Department and staff overseeing the Town and Country Planning Act, as well as other key stakeholders from Tourism, the private sector and civil society.

Source: TNA project

Chapter 2 Technology Action Plan and Project Ideas for the Water Sector

2.1 TAP for the Water Sector

2.1.1 Sector overview: Seychelles Water Sector

The Seychelles is facing water security issues. It is recognised that current water supply on Mahé, Praslin and La Digue is insufficient to meet demand, now and in the future. Water security is a cross-cutting issue that affects all sectors of society. Inefficient use of water leads to opportunity costs in the form of lost economic production and societal welfare, which impacts on current and future generations. Although there is sufficient rainfall of the order of 2369 mm (mean annual) per year, there is significant run off to the ocean, not enough capture and storage and important leakage in the distribution system. Increasing water demand from the residential, commercial, agriculture, and tourism sectors is further exacerbated by changes in rainfall patterns (Republic of Seychelles, 2017a).

The Public Utility Corporation (Water Division) has the mandate to collect, store and distribute safe water in the country. The majority (95%) of homes are connected to the PUC treated water supply, the remainder using river and/or rainwater. Since 2005, PUC has commissioned a series of 6 reverse osmosis desalination plants on the main granitic islands (4 on Mahé, 1 on Praslin and 1 on La Digue) that provide water in the system to cater for the drier periods. Seychelles has in the recent past years often experimented water distribution restrictions during long periods of drought. During these periods potable water is distributed to households by water bowser, which is not a cost effective measure.

Vulnerability to climate change

Climate change will increase the natural variability of rainfall patterns and is likely to generate more extreme events, such as floods and droughts. These phenomena are expected to have significant effects on water safety and security, altering patterns of availability and distribution, and increasing water contamination especially in a context of increased demand due to population growth and economic development (Republic of Seychelles, 2017a). Results from four global circulation models carried out during the SNC (GOS, 2011b) have indicated that climate change is expected to increase the severity of water shortages on Mahé, Praslin and La Digue because of the following factors: (i) decreases in rainfall during the dry southeast monsoon which will reduce stream flow, groundwater recharge and therefore water supply; (ii) increases in surface-air temperatures, which will increase rates of evapo-transpiration and consequently reduce stream flow, ground water recharge and further exacerbate the water supply problem; and (iii) increases in rainfall intensity which will result in greater surface runoff and reduced water capture in existing storage facilities.

Existing Policies and Legislation in the Water Sector

The main instruments of the legal framework for the water sector are (Republic of Seychelles, 2017a):

- Public Utilities Corporation (PUC) Act (1985): The management of the water resources falls under the responsibility of a parastatal Agency: the Public Utilities Corporation (PUC) which is under MEECC. PUC implements the PUC Act that also defines water supply standards. The PUC has the responsibility to provide treated domestic water supply to all Seychellois in accordance with international standards for potable water; and
- State Land and River Reserves Act (Cap 150) of 1903 establishes the concept of watershed protection zones along rivers and rivulets. This is somewhat outdated and has not been implemented.

Various elements of water management are also contained in the following legislations:

- The Public Health Act (Act 18 of 1960).
- The Town and Country Planning Act (Act 21 of 1972).
- The Environmental Protection Act (Act 71 of 1995).
- The Disaster Risk Management Act (Act 15 of 2014).
- The Water Act (Act 21 of 1982).

However, there is no single piece of legislation that outlines how the nation's water resources are to be protected, used, developed, managed and controlled in a way that takes account of efficiency, equity and sustainability, and that ensures public involvement in decision-making around water use, its allocation and protection. The PUC Act is mainly a water services act - it makes provision for water supply and sanitation, but it does not explicitly include provision for the efficient, equitable or sustainable use of water. An integrated national water policy for the Seychelles is currently being developed and is yet to be endorsed. This has hindered progress towards integrated water resourcesmanagement (IWRM), and the institutional strengthening required for implementing it.

An overview of prioritised technologies

The top three ranked water sector adaptation technologies were (Republic of Seychelles, 2017a):

1. **Rooftop rainwater harvesting with water treatment and safe storage:** This climate change adaptation technology is based on encouraging each household to have rainwater harvesting (RWH) system with appropriate water treatment and water storage. Only 4.5% of households are equipped with RWH systems. RWH has potential for scaling up and can contribute significantly to reduce climate vulnerability at the household level primarily by diversifying household water supply, and by increasing resilience to water quality degradation.

2. **Water efficient appliances:** The residential sector is the highest end-use sector in Seychelles. Residential water conservation efforts can make a positive contribution to reducing pressure on water resources. However, the market penetration of water-efficient appliances is low. Encouraging each household to have water efficient devices with the appropriate framework is a national priority to reduce pressure on water resources and to increase the climate resilience of the population.

3. **Ground surface rainwater harvesting:** Lack of adequate water supply during drought and seasonal dry periods can have a significant economic impact on the agricultural sector. Ground surface runoff water is important in the Seychelles because of the country's geology, topography and rainfall patterns. This technology is based on improving storage of surface runoff water by building gabion structures in order to provide a more constant and regular water supply for agricultural production, thereby minimising the impact of climate change on crop and livestock production and improving the food security situation in the Seychelles.

2.1.2 Action Plan for Rooftop Rainwater Harvesting (RWH)

2.1.2.1 Introduction

Rooftop RWH is a technology used for collecting and storing rainwater from the roof of buildings, and in this particular case from the roofs of residential buildings. The harvested rainwater is mainly for non-potable use, including: toilet flushing; clothes wash – including washing machines; watering the garden; and washing cars and other outside uses. Typically, independent trials in Caribbean and South Pacific Islands have shown that a domestic RWH system can reduce significantly mains-water consumption (Republic of Seychelles, 2017a). No trials have been conducted in the Seychelles to ascertain the extent of water supply diversification that rooftop RWH can bring to households. A

census has shown that only 4.5% of households in Seychelles have RWH tanks, while 47.1% of households have a water storage tank (Republic of Seychelles, 2017a).

The cost of a complete RWH system will vary depending on the fitting required for the conveyance system and the storage capacity. For the example of a household of 4 persons, a simple gravity rooftop RWH system with a storage capacity of 500 litres would cost approximately 16,000 SCR (Republic of Seychelles, 2017b).

Annex 1lists the members of the technical working group (TWG) for rooftop RWH who were consulted during the TAP development process. It also summarises the keys benefits expected from the technology, and the current status at national level.

2.1.2.2 Ambition for the TAP

Twenty five thousand (25,000) households are targeted over a period of 5 years corresponding to 90% of total household nationwide.

2.1.2.3 Actions and Activities selected for inclusion in the TAP

This section provides a discussion of the Actions and Activities that have been selected to inclusion in the RWH TAP. The Actions are linked to the measures that were identified following detailed analyses of barriers facing the technology (Government of Seychelles, 2017b), as well as the enabling environment required to promote the technology.Project Ideas have been proposed to start the technology transfer process by focusing on Actions and Activities of immediate urgency and that will focus on promoting an enabling environment which is supportive of other adaptation technologies.

Summary of Barriers and measures to overcome barriers

Table 18 summarises the barriers identified and measures proposed to overcome these barriers for the diffusion of rooftop RWH (Republic of Seychelles, 2017b).

Table 18. Overview of barriers and measures to overcome barriers for RWH.

Categories	Identified barriers	Measures to overcome barriers
Economic and financial	• High capital cost of RWH systems • RWH is not an investment priority for households, especially in the context of high upfront capital cost • Lack of cheap capital available to households (high interest rates for unsecured loans) • Lack of financial incentives for RWH	• Establish a subsidised loan scheme for RWH • Remove Value Added Tax for RWH equipment
Market conditions	• Limited number of suppliers and limited technology choice • Monopoly - Underdeveloped competition;	Improve access to quality products and services
Legal and regulatory	• No Supportive policy and regulatory instrument • There are no national rainwater harvesting standards and regulations • Rainwater harvesting is not	• Support the development of a national water policy and Act • Develop national standards and regulations for RWH

	integrated in building codes	• Revised the building code to integrate RWH
Institutional and organizational capacity	There is no overreaching institution for IWRM	Support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and rainwater harvesting
Information and awareness	• Limited knowledge on RWH Technologies • Limited knowledge on how to install a RWH system • Limited knowledge on long term benefit of RWH • Lack of awareness about issues related to climate change and water	• Setting up a website or webpages within another website with basic information about RWH, how it works, its benefits and its drawbacks, and contact details for local RWH suppliers • Writing and publishing a series of articles about RWH for one of the local newspapers focusing on the same content as the website. • Creating and broadcasting an animated TV spot introducing RWH and its benefits • Holding a RWH exhibition in district with RWH Suppliers, PUC, and MEECC • Establish reference project in each district

Source: Republic of Seychelles, 2017b

Actions selected for inclusion in the TAP

Measures proposed were ranked in consultation with the technical group. Criteria used as per TAP guidelines were (UNFCCC and UNEP DTU Partnership, 2017):

- The effectiveness of the measures toward technology implementation, i.e. how strongly is the measure expected to lead to the goal of technology implementation;
- The efficiency of the action to achieve this effectiveness, i.e. does the action enable implementation at the lowest cost in terms of human and financial resources?;
- Possible positive or negative interactions or conflicts with other measures, in particular policies, in the sector or county, which could affect the measure's effectiveness and efficiency; and
- Suitability of the action within the country or sector context; for instance, based on good practice examples, the action can be effective, but local acceptance of the action in the country may be lower than observed elsewhere.

Ranking results varies from 1 to 3, with 3 being the lowest possible score.[2] **Table 19** shows the results of the ranking of measures to be included in the TAP for RWH.

Table 19. Ranking of measures for inclusion in the RWH TAP.

Measures to overcome barriers	Considerations	Assessment	Ranking
Financial barriers 1. Establish a	Effectiveness	yes	3 (low urgency) Access to subsidised loan scheme finance is a relatively cost-effective
	Efficiency	yes	

[2] The scores can be related to level of urgency with: 3 - 'low urgency'; 2 – 'moderate urgency'; 1 – 'high urgency'.

subsidised loan scheme for RWH	Interactions with other measures	no	measure. However, in comparison with the other actions, this action does not rank the highest because its impacts are direct and is depended on how much money financiers are willing to make available and how much money households are willing to invest.
	Suitability	yes	
	Benefits & costs	yes	
<u>Financial barriers</u> 2. Remove Value Added Tax on RWH equipment	Effectiveness	yes	2 (moderate urgency) VAT Exemption has a direct impact on the cost RWH technology and is particularly helpful for making the technology more affordable for a larger group of household. However, VAT exemption will result in losses in government revenue.
	Efficiency	yes	
	Interactions with other measures	no	
	Suitability	yes	
	Benefits & costs	yes	
<u>Market conditions</u> 3.Improve access to quality products and services	Effectiveness	yes	1 (high urgency) Better access to products and services of technologies are particularly helpful for a wider scale implementation of the technology for a larger group of households. This measure is relatively cheap
	Efficiency	yes	
	Interactions with other measures	no	
	Suitability	yes	
	Benefits & costs	yes	
<u>Legal and regulatory</u> 4. Support the development of a national water policy and a Water Act	Effectiveness	yes	1 (high urgency) This is a measure of crucial importance which will set a new policy and regulatory framework for the water sector .This measure is relatively cheap as it only requires consultation with stakeholders and support from a consultant
	Efficiency	yes	
	Interactions with other measures	yes	
	Suitability	yes	
	Benefits & costs	yes	
<u>Legal and regulatory</u> 5. Develop national standards and regulations for RWH	Effectiveness	yes	2 (moderate urgency) This measure is important to ensure quality of the equipment imported and that installation is done according to the regulations mostly for health safety reasons. This measure is relatively cheap to develop as it requires consultation with stakeholders and the support of a consultant. However ,implementation of the measure through the enforcement of the standards and the regulations could be more costly for the government
	Efficiency	yes	
	Interactions with other measures	no	
	Suitability	yes	
	Benefits & costs	yes	
<u>Legal and regulatory</u> 6. Revised the building code to integrate RWH	Effectiveness	yes	1 (high urgency) This measure is a cost effective way to integrate RWH into new building .It requires consultation of stakeholders and the support of a consultant
	Efficiency	yes	
	Interactions with other measures	yes	
	Suitability	yes	
	Benefits & costs	yes	
<u>Institutional and Organisational</u> 7. Support the	Effectiveness	yes	2 (moderate urgency) This measure is crucial to promote integrated water resources management at national level. It will contribute
	Efficiency	yes	
	Interactions with other measures	yes	

establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and rainwater harvesting	Suitability	yes	significantly to the diffusion of RWH at national level. However, the running costs and the establishment costs of such institution maybe important and national budget allocation may not be available
	Benefits & costs	yes	
Information and awareness 8. Increase public information and awareness on RWH via media	Effectiveness	yes	1 (high urgency) This measure is important to promote and diffuse the RWH technology among a large group of households. It is relatively cheap measure which a high potential impact
	Efficiency	yes	
	Interactions with other measures	yes	
	Suitability	yes	
	Benefits & costs	yes	
Information and awareness 9. Establish project reference in districts	Effectiveness	yes	1 (high urgency) This is an effective measure which can directly demonstrate to households the benefits of RHW .It is a relatedly cheap measure
	Efficiency	yes	
	Interactions with other measures	no	
	Suitability	yes	
	Benefits & costs	yes	

Source: TNA project

The final selection of measures to be included in the TAP is presented in **Table 20**.

Table 20. Final selection of measures to be included as Actions in TAP for RWH.

Categories	Identified measures to overcome barriers	Measures selected as Actions for inclusion in TAP
Economic and financial	• Establish a subsidised loan scheme for RWH • Provide an exemption of Value Added Tax for RWH equipment	Remove Value Added Tax on RWH equipment
Market conditions	Improve access to quality products and services	Improve access to quality products and services
Legal and regulatory	• Support the development of a national water policy and a water Act • Develop national standards and regulations for RWH • Revised the building code to integrate RWH	• Support the development of a national water policy and a water Act • Develop national standards and regulations for RWH • Revised the building code to integrate RWH
Institutional and organizational capacity	Support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and rainwater harvesting	Support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and rainwater harvesting
Information and awareness	• Increase public information and awareness via selected • Establish project reference in districts	• Increase public information and awareness via selected media • Establish project reference in districts

Source: TNA project

Activities identified for implementation of selected Actions

The Actions constituting the TAP for rooftop RWH are listed in **Table 21** together with the Activities accompanying each one of them.

Table 21. Identification of specific Activities to support Actions in the RWH TAP.

Action 1:	**Remove Value Added Tax on RWH equipment**
Action 2:	**Improve access to quality products and services**
Action 3:	**Support the development of a national water policy and a Water Act**
Action 4:	**Develop national standards and regulations for RWH**
Action 5:	**Revised the building code to integrate RWH**
Action 6:	**Support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and rainwater harvesting**
Action7:	**Increase public information and awareness via selected media**
Action8:	**Establish project reference in districts**
Activities for Action implementation	
Action 1:Remove Value Added Tax on RWH equipment	
Activity 1.1	Recruit finance legal expert to lead the process
Activity 1.2	Meetings with Ministry of Finance to discuss regulations to be developed under VAT Act
Activity 1.3	Analyse financial impact of the proposed VAT exemption
Activity 1.4	Meetings with MEECC to define list of equipment eligible and verification process
Activity 1.5	Draft regulation in liaison with the attorney general office
Activity 1.6	Prepare Cabinet ministers memorandum paper
Activity 1.7	Information session with importers on new regulation and procedures adopted
Action 2: Improve access to quality products and services	
Activity 2.1	Meetings with manufacturers, importers and installers of RWH equipment to discuss RWH exhibition
Activity 2.2	Meetings with MEECC ,PUC and district administration to discuss RWH exhibition
Activity 2.3	Hold in each district a RWH exhibition with RWH Suppliers, PUC, and MEECC
Action 3:Support the development of a national water policy and a Water Act	
Activity 3.1	Recruit water policy, legal expert
Activity 3.2	Organise consultation process with keys stakeholders in the water sector
Activity 3.3	Draft water policy
Activity 3.4	Technical validation of water policy and water Act
Activity 3.5	Prepare cabinet minister memorandum on water policy and Act for approval
Action 4:Develop national standards and regulations for RWH	
Activity 4.1	Recruit standards expert for RWH
Activity 4.2	Review existing international standards on RWH
Activity 4.3	Organise consultation process with keys stakeholders in the water sector
Activity 4.4	Draft Standards for RWH
Activity 4.5	Technical validation of RWH standards
Activity 4.6	Prepare Cabinet Ministers paper on RWH standards for approval
Action 5: Revise the building code to integrate RWH	
Activity 5.1	Recruit consultant to review and integrate RWH in building code
Activity 5.2	Organise consultation process with keys stakeholders in the construction sector
Activity 5.3	Prepare cabinet paper for approval
Action 6: Support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and rainwater harvesting	
Activity 6.1	Recruit consultant to develop mandate,organogram of the proposed institution
Activity 6.2	Organise consultation and validation process with keys stakeholders in the water sector
Activity 6.3	Determine investment and recurrent budget required
Activity 6.4	Prepare cabinet ministers paper for approval
Action 7:Increase public information and awareness via selected media	
Activity 7.1	Recruit lead information and awareness expert for the RWH

Activity 7.2	Publish awareness raising publications for local newspapers and existing keys website
Activity 7.3	Produce documentary and TV spots on RWH
Action 8:Establish project reference in districts	
Activity 8.1	Consultation process with district administration and identification of pilot sites
Activity 8.2	Purchase and install RWH equipment in each district
Activity 8.3	Diffusion of results in the household in the district

Source: TNA project

Actions to be selected as Project Ideas

The approach used to selecting Actions/Activities for inclusion as PIs is the same as that used for TAPs in the Coastal Zond sector. The PIs include Actions that are urgent and prerequisites for other Actions, and those that create the enabling environment for multiple adaptation technologies. Therefore, the PIs for RWH consist of the following:

- Action 1: Remove VAT on RWH equipment;
- Action 3: Establish National Water Policy and Water Act;
- Action 6: Setting up an overarching national water institution; and
- Action 7: Promoting public information and awareness.

2.1.2.4 Stakeholders and Timeline for implementation of TAP

Overview of Stakeholders

The roles of the main stakeholders for the implementation of the TAP for RWH are given in **Table** 22.

Table 22. Roles of main stakeholders involved in the implementation of the RWH TAP.

Key Stakeholders	Role
Public Utilities Corporation, Water Division (PUC) (All Actions)	The management of the water resources falls under the responsibility of a parastatal Agency: the PUC which is under MEECC. PUC implements the PUC Act that also defines water supply standards. The PUC has the responsibility to provide treated domestic water supply to all Seychellois in accordance with international standards for potable water. As the central player in the water sector, the PUC will be involved in the planning and implementation of all the Actions in the TAP and PI.
Ministry of Environment, Energy and Climate Change (MEECC) (All Actions)	The MEECC is the line ministry that oversees the operation of PUC. While the PUC is run by an independent Board of Directors, the Board is Chaired by the MEECC. The MEECC is also responsible for developing national policies and regulations in the water sector. It is also mandated to propose institutional reforms or restructuring in order to improve the productivity and enhanced services in the sector. MEECC can also use its position to coordinate all stakeholders in the water sector.
Seychelles Bureau of Standards (SBS) (Action 4)	The SBS is mandated to provide standardisation in relation to commodities, processes and practices.The Bureau is under the responsibility of the Ministry of Investment, Entrepreneurship Development & Business Innovation (MIEDBI). It will be responsible for developing standards for RWH proposed under Action 4.
Ministry of Finance, Trade and Economic Planning (MFTEP) (Action 1)	MFTEP is the mandated public institution to take the decision to provide financial incentives in the form of eliminating VAT on equipment and parts related to RWH system. Consequently, the ministry will be closely involved in the Activities pertaining to Action 1.
Ministry of Land Use and Habitat(MLUH) (Action 5)	The MLUH will be responsible for developing Building Codes for the integration of RWH and water efficient devices proposed under Action 5.
Seychelles Chamber of Commerce and Industry (SCCI)	Since the TAP is geared towards enhancing the participation of the private sector in the market for promoting RWH, and given that the deployment of

Key Stakeholders	Role
(Actions 1, 7 and 8)	any technology would be supported by putting in place an appropriate value chain, it is proposed that the SCCI[3] be involved under Actions 1, 7 and 8. Further, it is necessary to include the umbrella body for the private sector in discussions related to the development of standards for RWH (Action 4) and Action 2 to publicise and promote RWH in districts.
Local / District Administrations (Actions 2, 7 and 8)	A district administration operates in each of the districts under the aegis of the ministry responsible for Local Government. The primary role of the district administration is to serve as an interface between the community in the affairs of the district and promoting access to public services at the local level. It operates in partnership with local representative groups and associations, community-based public and non-government agencies, the Member of the National Assembly, and the District Community Council. District local administration will play the crucial role of interfacing with local communities for the promotion of awareness of RWH (Action 7), to participate in exhibitions of RWH products and equipment (Action 2) and will be decisive in establishing project references (Action 8)
Media Houses (Action 7)	Disseminate information about the benefits of RWH, including its usefulness in adapting to changes in precipitation levels due to climate change.

Source: TNA project

Scheduling and sequencing of specific activities

A detailed timetable for the activities can be found in the TAP planning table (**Table 23**). This TAP is planned for implementation over the period 2019-2023. For the eight actions envisioned in the RWH TAP, the sequencing of Activities would be as follows:

Action 1: Remove Value Added Tax on RWH equipment – Urgent start in year 1 (Q1-2019 to Q4-2019)

Action 2: Improve access to quality products and services–Exhibitions will be carried out in districts between 2019 and 2022 in order to promote access to RWH equipment;

Action 3: Support the development of a national water policy and Water Act–This enabling Action will be carried out at the omset of the TAP implementation and it will also form part of the PI as an urgent Action. Since multi-stakeholder coordination and meetings will be required, this Action will not be completed (i.e. policy and Water Act approved) until Q3-2020;

Action 4: Develop national standards and regulations for RWH–Before quality products are made available on the local market, there will be a need to establish technical standards for certifying the quality of RWH equipment. The Activities will start early in 2019 and the standards are expected to be approved by Q3-2020;

Action 5: Revise the Building Code to integrate RWH–Activities completed between Q2-2019 andQ2-2020;

Action 6: **Support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and rainwater harvesting -** Activities completed between Q1-2019 andQ1-2020;

Action 7: **Increase public information and awareness via selected media on RWH**–The Activity will be initiated at the beginning of 2019 and will continue on a regular basis until the end of the TAP lifetime – i.e. 2023. A documentary and TV spots on RWH will be completed at the beginning of 2020;

[3]The SCCI is a registered association of businesses operating in Seychelles and is the most representative intermediary body of the private sector with a wide membership of some 220 members, which includes all the main economic operators in the country, as well as the main professional organisations and associations. Some of its aims are: to be the respected advisor to Government and Business on economic and fiscal policies and issues; to be an effective provider of services, support and assistance for the development of business and free enterprise; to defend business against discriminatory rules and regulations, and to be Champions of fair business practice (http://www.seychelles.travel/en/contacts/local-services/mah/seychelles-chamber-of-commerce-industry-scci - accessed 7 March 2018).

Action 8: **Establish project reference in districts on RWH**–Siting to install RWH in districts will be completed in Q1-2019, and installation of reference RWH systems in all districts will be carried out between Q2 and Q4 2019. Results of performance will be disseminated to households between Q3-2019 and Q2-2020.

2.1.2.5 Estimation of Resources Needed for Action and Activities

Table 23 shows the timeframe for implementing activities, the institution(s) responsible for preparation and implementation, and the costing and potential sources of funding available for each Activity related to the deployment of rooftop RWH.

Estimation of capacity building needs

As illustrated in **Table 23**, there is no need for any specific capacity building need regarding the scaling up of RWH systems in Seychelles. This is because the system is very simple and uses existing equipment. The only capacity that will be built is for companies and installers of RWH systems to understand the proposed Building Code and standards. This is already built in the TAP design.

Estimations of costs of actions and activities

The TAP would require a budget of around USD 317,000 for its implementation. Funding can be sought from international agencies (USD 306,000) but some costs would need to be borne by the Government of Seychelles (grant: USD3,000; in-kind: USD8,000) as show in Error! Reference source not found.. The public institutions that will provide the grant and in-kind contributions are listed in the planning table.

2.1.2.6 Management Planning

Risks and Contingency Planning

Table 24provides an overview of the main risks to the successful implementation of the TAP for RWH

Next steps

The immediate requirement to proceed with the implementation of the TAP and the proposed Project Idea (PI) is to obtain political support for the TAP. This can be secured through a two stage process, namely:

1. Cabinet approval: The MEECC, with the support of SEC, MFA, SNPA and PUC, need to ensure that the validated TAP receives the approval of the Cabinet of Ministers. The Cabinet is the highest instance of decision making in government; and
2. TAP Steering Committee: The next logical step would be to put in place a Steering Committee (SC) that will oversee the execution of the TAP and PI. It is proposed that the members of the SC will be constituted by the stakeholders listed in **Table 22**. The SC may be presided by the MEECC.

Three critical steps have been identified that need to be controlled in order to promote rooftop RWH. Each critical step serves to minimising risks. The critical steps are also related to the fact that the technology uptake is premised on developing synergies between Actions – i.e. overcoming barriers and associated risks independently of each other will not lead to technology transfer. With these considerations in mind, the critical steps are:

- Appointment of Services Provider (Finance and Legal Expert) to develop regulations for VAT exemption: One of the main barriers that need to be overcome is financial. Providing incentive in the form of VAT exemption of RWH equipment is directly under the control of government, and can play a catalytic role in creating market demand for the technology;
- Conducive regulatory framework: The technology is expected to be implemented using private investments. For this to happen, market visibility supported by an appropriate national policy and supporting instruments such as legislation, regulations and standards are necessary; and

- Awareness creation: Market demand can be stimulated by demonstrating the effectiveness of the proposed technology through publications, technology demonstrations, and linking households to market players through exhibitions.

Table 23. Planning table - characterisation of Activities for implementation of Actions.

Action 1:	**Remove Value Added Tax on RWH equipment**									
Activities	**Planning**				**Implementation**				**Costs and funding needs**	
	Start	Complete	Who?	Capacity needs	Start	Complete	Who?	Capacity needs	Costs (USD)	Who will fund?
Activity 1.1 Recruit finance legal expert to lead the process	Q1-2019	Q1-2019	MEECC	None	Q1-2019	Q2-2019	MEECC	None	25,000	Development Partners
Activity 1.2 Meetings with MFTEP to discuss regulations to be developed under VAT Act	Q1-2019	Q1-2019	MEECC	None	Q2-2019	Q4-2019	MEECC	None	1,000 (in-kind)	Government
Activity 1.3 Analyse financial impact of the proposed VAT exemption	Q2-2019	Q2-2019	MEECC/MFTEP	None	Q2-2019	Q4-2019	MEECC and MFTEP	None	Covered under Activity 1.1	Development Partners
Activity 1.4 Meetings with MEECC to define list of equipment eligible and verification process	Q2-2019	Q2-2019	MEECC	None	Q2-2019	Q2-2019	MEECC	None	1,000 (in-kind)	Government (MEECC)
Activity 1.5 Draft regulation in liaison with the Attorney General's Office	Q2-2019	Q2-2019	MEECC/MFTEP /Attorney General's Office	None	Q2-2019	Q4-2019	MEECC/MFTEP /Attorney General's Office	None	Covered under Activity 1.1	Development Partners
Activity 1.6 Prepare Cabinet ministers memorandum paper	Q2-2019	Q2-2019	MEECC/MFTEP	None	Q3-2019	Q3-2019	MEECC/MFTEP	None	Covered under Activity 1.1	Development Partners
Activity 1.7 Information session with importers of new regulation and procedures adopted	Q3-2019	Q3-2019	MEECC, MFTEP, SCCI	None	Q4-2019	Q4-2019	MEECC, MFTEP, SCCI	None	5,000	Development Partners
Action 2:	**Improve access to quality products and services**									
Activities	**Planning**				**Implementation**				**Costs and funding needs**	
	Start	Complete	Who	Capacity needs	Start	Complete	Who	Capacity needs	Costs USD	Who will fund

Activity 2.1 Meetings with manufacturers, importers and installers of RWH equipment to discuss RWH exhibition	Q3-2019	Q3-2019	SCCI, and private companies	None	Q3-2019	Q3-2019	MEECC, SCCI, and private companies	None	3,000	Government and SCCI
Activity 2.2 Meetings with MEECC,PUC and district administration to discuss RWH exhibition	Q3-2019	Q3-2019	MEECC, PUC and District Administration	None	Q3-2019	Q3-2022	MEECC, PUC and District Administration	None	6,000	Development Partners
Activity 2.3 Hold in each district a RWH exhibition in district with RWH Suppliers, PUC, and MEECC	Q3-2019	Q3-2019	MEECC ,PUC district administration , private companies	None	Q3-2019	Q3-2022	MEECC, PUC, District Administration, Private companies	None	50,000	Development Partners
Action 3:	**Support the development of a national water policy and Water Act**									
Activities	**Planning**				**Implementation**				**Costs and funding needs**	
	Start	Complete	Who	Capacity needs	Start	Complete	Who	Capacity needs	Costs USD	Who will fund
Activity 3.1 Recruit water policy legal expert	Q2-2019	Q2-2019	MEECC	None	Q3-2019	Q3-2019	MEECC	None	20,000	Development Partners
Activity 3.2 Organise consultation process with keys stakeholders in the water sector	Q3-2019	Q3-2019	MEECC	None	Q4-2019	Q1-2020	MEECC	None	5,000	Development Partners
Activity 3.3 Drafting water policy and Act	Q1-2020	Q1-2020	MEECC	None	Q2-2020	Q2-2020	MEECC	None	Covered under Activity 3.1	Development Partners
Activity 3.4 Technical validation of water policy and Act	Q2-2020	Q2-2020	MEECC	None	Q3-2020	Q3-2020	MEECC	None	2,000	Development Partners
Activity 3.5 Prepare Cabinet of Minister memorandum on water policy and Act for approval	Q3-2020	Q3-2020	MEECC	None	Q3-2020	Q3-2020	MEECC	None	1,500 (in-kind)	Government (MEECC)
Action 4:	**Develop national standards and regulations for RWH**									
Activities	**Planning**				**Implementation**				**Costs and funding needs**	
	Start	Complete	Who	Capacity needs	Start	Complete	Who	Capacity needs	Costs USD	Who will fund
Activity 4.1 Recruit standards expert for RWH	Q2-2019	Q2-2019	MEECC/SBS	None	Q3-2019	Q3-2019	MEECC/SBS	None	25,000	Development partners

Activity 4.2 Review existing international standards on RWH	Q3-2019	Q3-2019	MEECC/SBS	none	Q4-2019	Q4-2019	MEECC/SBS	None	Covered under Activity 4.1	Development partners
Activity 4.3 Organise consultation process with keys stakeholders in the water sector	Q4-2019	Q4-2019	MEECC /SBS	none	Q4-2019	Q2-2020	MEECC/SBS	None	5,000	Development partners
Activity 4.4 Draft Standards for RWH	Q1-2020	Q1-2020	MEECC /SBS	none	Q2-2020	Q2-2020	MEECC/SBS	None	Covered under Activity 4.1	Development partners
Activity 4.5 Technical validation of RWH standards	Q2-2020	Q2-2020	MEECC/SBS	none	Q3-2020	Q3-2020	MEECC/SBS	None	8,000	Development partners
Activity 4.6 Prepare Cabinet Ministers paper on RWH standards for approval	Q3-2020	Q3-2020	MEECC /SBS	none	Q3-2020	Q3-2020	SBS	None	1,500 (in-kind)	Government (SBS)
Action 5:	**Revise the building code to integrate RWH**									
Activities	**Planning**				**Implementation**				**Costs and funding needs**	
	Start	Complete	Who	Capacity needs	Start	Complete	Who	Capacity needs	Costs USD	Who will fund
Activity 5.1 Recruit consultant to review and integrate RWH in building code	Q2-2019	Q2-2019	MEECC, MLUH	None	Q2-2019	Q2-2020	MEECC, MLUH	None	15,000	Development partners
Activity 5.2 Organise consultation process with keys stakeholders in the construction sector	Q3-2019	Q4-2019	MLUH	None	Q4-2019	Q2-2020	MLUH	None	5,000	Development partners
Activity 5.3 Prepare Cabinet Ministers paper for approval	Q2-2020	Q2-2020	MLUH	None	Q2-2020	Q2-2020	MLUH	None	1,500 (in-kind)	Government (MLUH)
Action 6	**Support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and rainwater harvesting**									
	Planning				**Implementation**				**Costs and funding needs**	
	Start	Complete	Who	Capacity needs	Start	Complete	Who	Capacity needs	Costs (USD)	Who will fund
Activity 6.1 Recruit consultant to develop mandate ,organigram of the proposed institution	Q1-2019	Q1-2019	MEECC	None	Q2-2019	Q2-2019	MEECC	None	20,000	Development partners
Activity 6.2 Organise consultation and validation process with keys stakeholders in the water sector	Q2-2019	Q2-2019	MEECC	None	Q2-2019	Q1-2020	MEECC	None	5,000	Development partners
Activity 6.3 Determine investment and recurrent budget required	Q2-2019	Q2-2019	MEECC	None	Q3-2019	Q1-2020	MEECC	None	Covered	Development

									under Activity 6.1	partners
Activity 6.4 Prepare cabinet ministers paper for approval	Q1-2020	Q1-2020	MEECC	None	Q1-2020	Q1-2020	MEECC	None	1,500 (in kind)	Government (MEECC)
Action 7	**Increase public information and awareness via selected media on RWH**									
	Planning				**Implementation**				**Costs and funding needs**	
	Start	Complete	Who	Capacity needs	Start	Complete step	Who	Capacity needs	Costs USD	Who will fund
Activity 7.1 Recruit lead information and awareness expert for the RWH	Q1-2019	Q1-2019	MEECC	None	Q2-2019	Q2-2019	MEECC	None	20,000	Development partners
Activity 7.2 Published article for local newspapers and existing website	Q2-2019	Q2-2019	MEECC	None	Q2-2019	2023	MEECC	none	2,000 (per year)	Development partners
Activity 7.3 Produce documentary and TV spots on RWH	Q2-2019	Q2-2019	MEECC	None	Q3-2019	Q1-2020	MEECC	None	10,000	Development partners
Action 8	**Establish project reference in districts on RWH**									
	Planning				**Implementation**				**Costs and funding needs**	
	Start	Complete	Who	Capacity needs	Start	Complete	Who	Capacity needs	Costs USD	Who will fund
Activity 8.1 Consultation process with district administration and identification of pilot sites	Q1-2019	Q1-2019	MEECC, District Administrations	None	Q1-2019	Q1-2019	MEECC, District Administrations	None	10,000	Development partners
Activity 8.2 Purchase and install RWH equipment in districts	Q1-2019	Q1-2019	MEECC, District Administrations	None	Q2-2019	Q4-2019	District Administrations	None	50,000	Development partners
Activity 8.3 Diffusion of results in the household in the districts	Q2-2019	Q2-2019	MEECC, District Administrations	None	Q3-2019	Q2-2020	MEECC, District Administrations	None	10,000	Development partners

Source: TNA project

Table 24. Risks associated with the RWH TAP and their mitigation measures.
Source: TNA project

Type of risk	**Related to Acti or Activity**	**Description of risk**	**Contingency actions**	
1 .Cost Risks	All types of activities	An activity costs more than originally planned	***Time interval for M&E:***	Quarterly
			M&E responsibility:	MEECC
			Contingency measures needed:	Budget will need to be revised on a quarterly basis
			Responsibility contingency measure	MEECC
			Timing contingency measure:	0-5 years
2. Human resource is available nationally	Activity 1.1,3.1,4.1.5.1,6.1 .1	No local consultant available undertake the work	***Time interval for M&E:***	Monthly
			M&E responsibility:	MEECC
			Contingency measures needed:	Vacancy will need to be advertised regionally a internationally
			Responsibility contingency measure	MEECC
			Timing contingency measure:	0-5 years
3. Performance Risks	All types of activities	A technology or human resource do not perform as planned environmental and social benefits delivered	***Time interval for M&E:***	Once 6 months
			M&E responsibility:	MEECC
			Contingency measures needed:	Establishment of a project steering committee project management unit to oversee proj performance which is able to take appropri measures when need it
			Responsibility contingency measure	MEECC
			Timing contingency measure:	0-5 year

Table 25 shows the overview of the TAP for rooftop RWH technology diffusion.

Table 25. TAP summary for rooftop RWH.

Sector: WATER SECTOR								
Technology: Rooftop Rainwater Harvesting (households)								
Ambition	**25,000 households are equipped with Rainwater Harvesting System over a 5 year period**							
Benefits:	**Reduce water restriction and deficit during dry period; Contribute to 50 jobs creation and increase household savings from water bills**							
Action	**Activities to be implemented**	**Sources of funding**	**Responsible body and focal point**	**Time frame (yr)**	**Risks**	**Success criteria**	**Indicators for Monitoring of implementation**	**Budget per activity (USD)**
Action 1 Remove Value Added Tax on RWH equipment	1.1 Recruit finance legal expert to lead the process	Development Partners	MEECC	2019	Inability to attract high caliber consultant	High caliber consultant recruited	Recruitment of consultant	25,000
	1.2 Meetings with MFTEP to discuss regulations to be developed under VAT Act	Government	MEECC	2019	Lack of political support from MFTEP	Strong political support from MFTEP	Number of meetings held and outcomes of meetings	1,000 (in-kind)
	1.3 Analyse financial impact of the proposed VAT exemption	Development Partners	MEECC and MFTEP	2019	Poor analyses does not favour an evidence-based approach to decision making	Good analyses very supportive of decision making	Analysis of financial impacts	Covered under Activity 1.1
	1.4 Meetings with MEECC to define list of equipment eligible and verification process	Government (MEECC)	MEECC	2019	Lack of human and institutional capacity of MEECC to draft list	A meaningful eligibility list of equipment drafted	List of eligibility equipment	1,000 (in-kind)
	1.5 Draft regulation in liaison with the Attorney General's Office	Development Partners	MEECC/MFTEP /Attorney General's Office	2019	Poor quality regulation drafted	Strong regulation drafted	Draft regulation	Covered under Activity 1.1
	1.6 Prepare Cabinet ministers memorandum paper	Development Partners	MEECC/MFTEP	2019	Badly written paper leads to queries over the need for policy and Act	Cabinet Paper is approved	Approval of proposal as per Government Gazette	Covered under Activity 1.1
	1.7 Information session with importers of new regulation and procedures adopted	Development Partners	MEECC, MFTEP, SCCI	2019	Lack of interest from importers	Strong collaboration with importers leads to strong interest to promote RWH	Number of importers conversant with new regulation	5,000
Action 2	2.1 Meetings with	Government	MEECC, SCCI,	2019	Lack of interest	Strong interest from	Number of	3,000

Improve access to quality products and services	manufacturers, importers and installers of RWH equipment to discuss RWH exhibition	and SCCI	and private companies		from manufacturers importers and installers of RWH systems	manufacturers importers and installers of RWH systems	manufacturers, importers and installers interested in participating in exhibition	
	2.2 Meetings with MEECC, PUC and district administration to discuss RWH exhibition	Development Partners	MEECC, PUC and District Administration	2019-2022	Lack of political support for carrying out exhibitions	Strong political support for exhibitions	Number of District Administrations interested to participate in exhibition	6,000
	2.3 Hold in each district a RWH exhibition in district with RWH Suppliers, PUC, and MEECC	Development Partners	MEECC, PUC, District Administration, Private companies	2019-2022	Poorly organised exhibition has low level participation for all stakeholders	Successful exhibitions held in all districts with strong private sector and community participation	Number of exhibitions held (by district); number of participants (by private company and community participation)	50,000
Action 3 Support the development of a national water policy and Water Act	3.1 Recruit water policy , legal expert	Development Partners	MEECC	2019	Inability to attract high caliber consultant	High caliber consultant recruited	Recruitment of consultant	20,000
	3.2 Organise consultation process with keys stakeholders in the water sector	Development Partners	MEECC	2019-2020	Lack of interest from stakeholders	Strong participation of stakeholders with constructive feedbacks	Number of consultations held; number of participants	5,000
	3.3 Drafting water policy and Act	Development Partners	MEECC	2020	Poor drafts of policy and Act	High quality policy and Act drafted	Draft water policy and Water Act	Covered under Activity 3.1
	3.4 Technical validation of water policy	Development Partners	MEECC	2020	Key stakeholders do not validate the draft policy and/or Act	Draft policy and Act validated by all stakeholders	Final water policy and Water Act	2,000
	3.5 Prepare cabinet minister memorandum on water policy and Act for approval	Government (MEECC)	MEECC	2020	Badly written paper leads to queries over the need for policy and Act	Cabinet Paper is approved	Approval of proposal as per Government Gazette	1,500 (in-kind)
Action 4 Develop national standards and regulations for RWH	4.1 Recruit standards expert for RWH	Development partners	MEECC/SBS	2019	Inability to attract high caliber consultant	High caliber consultant recruited	Recruitment of consultant	25,000
	4.2 Review existing international standards on RWH	Development partners	MEECC/SBS	2019	Consultant omissions to review key international standards that would be translated into national context	International standards reviewed and appraised for local context	Number of international standards reviewed and appraisal of transposability in local context completed	Covered under Activity 4.1
	4.3 Organise consultation	Development	MEECC/SBS	2019-	Lack of interest	Strong participation	Number of consultations	5,000

	process with keys stakeholders in the water sector	partners		2020	from stakeholders	of stakeholders with constructive feedbacks	held; number of participants	
	4.4 Draft Standards for RWH	Development partners	MEECC/SBS	2020	Poor draft standards	High quality standards drafted	Draft standards	Covered under Activity 4.1
	4.5 Technical validation of RWH standards	Development partners	MEECC/SBS	2020	Key stakeholders do not validate the draft standards	Draft standards validated by all stakeholders	Final Standards	8,000
	4.6 Prepare Cabinet Ministers paper on RWH standards for approval	Government (SBS)	SBS	2020	Badly written paper leads to queries over the need to develop standards to RWH	Cabinet Paper is approved	Approval of proposal as per Government Gazette	1,500 (in-kind)
Action 5 Revise the building code to integrate RWH	5.1 Recruit consultant to review and integrate RWH in building code	Development partners	MEECC, MLUH	2019-2020	Inability to attract high caliber consultant	High caliber consultant recruited	Recruitment of consultant	15,000
	5.2 Organise consultation process with keys stakeholders in the construction sector	Development partners	MLUH	2019-2020	Lack of interest from stakeholders	Strong participation of stakeholders with constructive feedbacks	Number of consultations held; number of participants	5,000
	5.3 Prepare Cabinet Ministers paper for approval	Government (MLUH)	MLUH	2020	Badly written paper leads to queries over the need for Building Code to promote RWH	Cabinet Paper is approved	Approval of proposal as per Government Gazette	1,500 (in-kind)
Action 6 Support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and rainwater harvesting	6.1 Recruit consultant to develop mandate, organogram of the proposed institution	Development partners	MEECC	2019	Inability to attract high caliber consultant	Mandate, organogram of new institution proposed	Mandate and organogram of new institution	20,000
	6.2 Organise consultation and validation process with keys stakeholders in the water sector	Development partners	MEECC	2019-2020	Lack of interest from stakeholders	High level of participation and contributions by key stakeholder in consultations	Number of consultations held, and number of stakeholders consulted	5,000
	6.3 Determine investment and recurrent budget required	Development partners	MEECC	2019-2020	Lack of access to information to estimate recurrent budget	Good estimate of recurrent budget obtained through high political ownership	Recurrent budget for new institution	Covered under Activity 6.1
	6.4 Prepare cabinet ministers paper for approval	Government (MEECC)	MEECC	2020	Badly written paper leads to queries over the setting up of a	Cabinet Paper is approved	Approval of proposal as per Government Gazette	1,500 (in kind)

					new institution in water sector			
Action 7 Increase public information and awareness via selected media on RWH	7.1 Recruit lead information and awareness expert for the RWH	Development partners	MEECC	2019	Inability to attract high caliber consultant	High caliber consultant recruited	Recruitment of consultant	20,000
	7.2 Published article for local newspapers and existing keys website	Development partners	MEECC	2019-2023	Low interest for media to carry publications and institutions hosting websites show little interest in project	5 newspaper publications per year and 5 websites hosting information on rooftop RWH	Number of publications per year; number of website carrying information on RWH	2,000 (per year)
	7.3 Produce documentary on RWH	Development partners	MEECC	2019-2020	Low quality documentary produced	High quality documentary produced and positively impacting household awareness	Number of documentary produced; number of persons reached with documentary	10,000
Action 8 Establish project reference in districts on RWH	8.1 Consultation process with district administration and identification of pilot sites	Development partners	MEECC, District Administrations	2019	Lack of interest from District Administrations	One high visibility site has been identified for installation of RWH system in each district	List of sites identified	10,000
	8.2 Purchase and install RWH equipment in district	Development partners	District Administrations	2019	Poor quality products and low quality craftsmanship leads to low performance of systems	A rooftop RWH system is installed in each district and performing well	List of equipment by district; volume of water harvested for each district; number of queries received from communities	50,000
	8.3 Diffusion of results in the household in the district	Development partners	MEECC, District Administrations	2019-2020	Poor communication due to little follow up on the project because of lack of political will from District Administrations	The performance of each system is disseminated widely to the population and awareness is high among potential end users	Level of awareness of population and propensity to purchase RWH system	10,000

Source: TNA project

2.1.3 Action Plan for Ground Surface Rainwater Harvesting (GWH)

2.1.3.1 Introduction

Lack of adequate water supply during drought and seasonal dry periods can affect economic development and have a significant impact especially in the agricultural sector.Most precipitation in the Seychelles runs off into rivers and is eventually lost to the sea. Small-scale water runoff collection infrastructure can contribute greatly to the volume of freshwater available for human use, mostly in the agriculture/livestock sector and landscaping. There are two main categories of technologies:

1. Collecting rainfall from ground surfaces utilising "micro-catchments" to divert or slow down runoff; and

2. Collecting flows from a river, stream or other natural watercourse.

The technology with the most potential in the Seychelles is small reservoirs with earthen bunds or embankments to contain runoff or river flow strengthened with gabions. This technology can help the agricultural sector to have a constant and regular water supply for agricultural production thereby minimising the impact of climate change on crop and livestock production, especially in the context of increasing water demand from all economic sectors.

It is estimated that the total capital cost for a typical system with gabion of a total volume of 220m^3 is SCR 720,000. Such a system could collect around 96,000m^3/year. The total maintenance cost is estimated at 120,000 SR per year (Republic of Seychelles, 2017a; 2017b). Most farmers are not paying for using the water directly from rivers and there is thus no motivation to adopt the technology. However, farmers are paying the normal water tariffs if they are using treated water supplied by PUC. This occurs generally during the dry season where rivers are drying out. In this context, investment in surface water harvesting remains of high importance for farmers but economic benefits are not clearly tangible compared to other spending priorities.

Annex 1 list the members of the technical working group for the ground surface rainwater harvesting (GWH) technology that were consulted during the process, and it summarises the main benefits expected from this technology. The current status of the technology at national level is also provided.

2.1.3.2 Ambition for the TAP

Fifty (50) sites are targeted over a period of 10 years on Mahe, Praslin and La Digue.

2.1.3.3 Actions and Activities selected for inclusion in the TAP

This section provides a discussion of the Actions and Activities that have been selected to inclusion in the GWH TAP. Project Ideas have been proposed to start the technology transfer process by focusing on Actions and Activities of immediate urgency and that will focus on promoting an enabling environment which is supportive of other adaptation technologies.

Summary of Barriers and measures to overcome barriers

Table 26 summarises the barriers identified and measures proposed to overcome these barriers for the diffusion of this technology (Republic of Seychelles, 2017b).

Table 26. Overview of barriers preventing the adoption of GWH, and the measures proposed to overcome them.

Categories	Identified barriers	Measures to overcome barriers
Economic and financial	• High capital cost of RWH systems • GWH is not an investment priority	• Establish a subsidised loan scheme for GWH

	for farmers, especially in the context of high upfront capital cost • Low water tariff for the agriculture sector acts as a deterrent for the adoption of the technology	• Remove Value Added Tax for GWH equipment
Legal and regulatory	• Lack of appropriate policy and legal framework for supporting GWH • Unclear water rights • Unclear application process for obtaining permits to construct GWH systems	Support the development of national water policy and Water Act, which should clarify water rights, indicate support for GWH (and other water supply technologies), and develop approval procedures for the construction of GWH systems among others
Institutional and organizational capacity	There is no overreaching institution for IWRM	Support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and ground surface rainwater harvesting
Human skills	Lack of technical expertise in IWRM and to design, install and maintain GWH systems	National capacity in water management and water engineering is strengthened by integrating modules on sustainable water management practices and water engineering in the environmental degree proposed at the University of Seychelles, and in vocational training curriculum
Information and awareness	• Lack of practical information on the benefits of GWH systems in agricultural production • Lack of awareness about issues related to the impacts of climate change on agriculture. • Limited knowledge of technical options to deal with adaptation to climate change	• Write and publish a series of articles about GWH for one of the local newspapers. • Hold district consultation workshops with farmers through the Farmers Association • Work in close collaboration with the extension support provide by the Seychelles Agricultural Agency
Technical	Lack of data related to hydrology and geology for most secondary rivers	A data collection system on hydrology and geomorphology of rivers is established to support IWRM planning and decision-making

Source: Republic of Seychelles, 2017b

Actions selected for inclusion in the TAP

The measures used to rank measures for inclusion in the GWH TAP are the same as the ones used for rooftop RWH. The results of the ranking of measures to be included in the TAP for GWH are shown in **Table 27**.

Table 27. Framework for ranking measures for inclusion as Actions in GWH TAP.

Measures to overcome barriers	Considerations	Assessment	Ranking

Financial barriers 1. Establish a subsidised loan scheme for GWH	Cost-effectiveness	yes	3 (low urgency) Access to subsidised loan scheme finance is a relatively cost-effective measure. In comparison with the other action, this action does not rank the highest because its impacts depends on how much money financiers are willing to make available and how much money farmers are willing to invest.
	Efficiency	yes	
	Interactions with other measures	no	
	Suitability	yes	
	Benefits & costs	yes	
Financial barriers 2. Remove Value Added Tax on GWH equipment	Cost-effectiveness	yes	1 (high urgency) VAT Exemption has a direct impact on the cost GWH technology and is particularly helpful for making the technology more affordable to farmers. It has precedence over the previous measure since it is under the control of government.
	Efficiency	yes	
	Interactions with other measures	no	
	Suitability	yes	
	Benefits & costs	yes	
Legal and regulatory 3. Support the development of a national water policy and Water Act	Cost-effectiveness	yes	1 (high urgency) This is a measure of crucial importance which will set a new policy and regulatory framework for the water sector .This measure is relatively cheap as it only requires consultation with stakeholders and a support from a consultant
	Efficiency	yes	
	Interactions with other measures	yes	
	Suitability	yes	
	Benefits & costs	yes	
Human skills 4. National capacity in water management and water engineering is strengthened by integrating modules on sustainable water management practices and water engineering in the environmental degree proposed at the University of Seychelles, and vocational training	Cost-effectiveness	yes	3 (low urgency) This measure is a cost effective way to build in the long-term national capacity in water management. It requires the development of a curriculum on water management adapted to the national context. The low urgency of this Action stems from the fact that it will be necessary in the medium-to-long term. It will not have an immediate impact on the technology transfer and diffusion.
	Efficiency	yes	
	Interactions with other measures	yes	
	Suitability	yes	
	Benefits & costs	yes	
Institutional and organizational capacity 5. Support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and rainwater harvesting	Cost-effectiveness	yes	2(moderate urgency) This measure is crucial to promote integrated water resources management at national level .It will contribute significantly to the diffusion of GWH at national level. However, the running costs and the establishment costs of such institution may be important and national budget allocation may not be available. Nevertheless, the overarching institution will play a harmonising role in promoting multiple adaptation technologies in the water sector
	Efficiency	yes	
	Interactions with other measures	yes	
	Suitability	yes	
	Benefits & costs	yes	
Information and awareness 6. Increase public information and awareness on RWH via media	Cost-effectiveness	yes	1 (high urgency) This measure is important to promote and diffuse the GWH technology among farmers. It is relatively cheap measure which a high potential impact
	Efficiency	yes	
	Interactions with other measures	yes	
	Suitability	yes	
	Benefits & costs	yes	

Technical barrier **7.** A data collection system on hydrology and geomorphology of rivers is established to support IWRM planning and decision-making	Cost-effectiveness	yes	2 (moderate urgency) This important measure can only be undertaken with the establishment of the overall institution of water management.Data will be shared widely and used for different purpose contributing to improve water management in the Seychelles. Because of its dependence on other Actions (5) and its longer term implications, it is not included in the TAP.
	Efficiency	yes	
	Interactions with other measures	yes	
	Suitability	yes	
	Benefits & costs	yes	

Source: TNA project

The final selection of measures to be included in the TAP are summarised in **Table 28.**

Table 28. Final selection of measures to be included as Actions in the GWH TAP.

Categories	Identified measures to overcome barriers	Measures selected as Actions for inclusion in TAP
Economic and financial	• Establish a subsidised loan scheme for GWH • Provide an exemption of Value Added Tax for GWH equipment	Remove Value Added Tax on RWH equipment
Legal and regulatory	Support the development of a national water policy	Support the development of a national water policy and related Act
Institutional and organizational capacity	Support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and ground surface rainwater harvesting	Support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and ground surface rainwater harvesting
Information and awareness	Increase public information and awareness via selected media	Increase public information and awareness via selected media

Source: TNA project

Activities identified for implementation of selected Actions

The Actions and accompanying Activities for implementing GWH are listed in**Table 29.**

Table 29. Identification and description of specific Activities to support Actions to implement GWH.

Action 1:	**Remove Value Added Tax on RWH equipment**
Action 2:	**Support the development of a national water policy and related Act**
Action 3:	**Support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and ground surface rainwater harvesting**
Action4:	**Increase public information and awareness via selected media on ground surface rainwater harvesting**
Activities for Action implementation	
Action 1:Remove Value Added Tax on GWH equipment	
Activity 1.1	Recruit finance legal expert to lead the process
Activity 1.2	Meetings with ministry of Finance to discuss regulations to be developed under VAT Act
Activity 1.3	Analyse financial impact of the proposed VAT exemption
Activity 1.4	Meetings with MEECC to define list of equipment eligible and verification process

Activity 1.5	Draft regulation in liaison with the Attorney General's Office
Activity 1.6	Prepare Cabinet ministers memorandum paper
Activity 1.7	Information session with importers of new regulation and procedures adopted
Action 2:Support the development of a National Water Policy and Water Act	
Activity 2.1	Recruit water policy legal expert
Activity 2.2	Organise consultation process with keys stakeholders in the water sector
Activity 2.3	Drafting Water Policy and Water Act
Activity 2.4	Technical validation of Water Policy and Water Act
Activity 2.5	Prepare cabinet minister memorandum on Water Policy and Water Act for approval
Action 3: Support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and ground surface rainwater harvesting	
Activity 3.1	Recruit consultant to develop mandate, organigram of the proposed institution
Activity 3.2	Organise consultation and validation process with keys stakeholders in the water sector
Activity 3.3	Determine investment and recurrent budget required
Activity 3.4	Prepare cabinet ministers paper for approval
Action 4:Increase public information and awareness via selected media on GWH	
Activity 4.1	Recruit lead information and awareness expert for the GWH
Activity 4.2	Published article for local newspapers and existing public websites
Activity 4.3	Produce documentary on GWH to demonstrate operation and benefits

Source: TNA project

Actions to be selected as Project Ideas

The approach used to selecting Actions/Activities for inclusion as PIs is the same as that used for RWH. The PIs for GWH consist of the following:

- Action 1: Remove VAT on GWH equipment;
- Action 2: Establish National Water Policy and Water Act;
- Action 3: Setting up an overarching national water institution; and
- Action 4: Promoting public information and awareness.

2.1.3.4 Stakeholders and Timeline for implementation of TAP

Overview of Stakeholders

The roles of the main stakeholders for the implementation of the TAP for GWH are given in **Table 30.**

Table 30. Roles of main stakeholders involved in the implementation of the GWH TAP.

Key Stakeholders	Role
Public Utilities Corporation, Water Division (PUC)	The management of the water resources falls under the responsibility of a parastatal Agency: the PUC which is under MEECC. PUC implements the PUC Act that also defines water supply standards. The PUC has the responsibility to provide treated domestic water supply to all Seychellois in accordance with international standards for potable water. It takes an interest in diversifying the sources of water supply that has a direct impact on water balance.
Ministry of Environment, Energy and Climate Change (MEECC) (All Actions)	The MEECC is also responsible for developing national policies and regulations in the water sector. It is also mandated to propose institutional reforms or restructuring in order to improve the productivity and enhanced services in the sector. MEECC can also use its position to coordinate all stakeholders in the water sector.

Key Stakeholders	Role
Ministry of Finance, Trade and Economic Planning (MFTEP) (Action 1)	MFTEP is the mandated public institution to take the decision to provide financial incentives in the form of eliminating VAT on equipment and parts related to GWH system. Consequently, the ministry will be closely involved in the Activities pertaining to Action 1.
Media Houses (Action 4)	Disseminate information about the benefits of RWH, including its usefulness in adapting to changes in precipitation levels due to climate change.
Seychelles Agricultural Agency (SAA) (Action 1 and 4)	The SAA operates under the aegis of the Ministry of Fisheries and Agriculture, and its mandate is to operationalise the policies and strategies of the Ministry. In particular, its role is to provide goods and services to the food producing entrepreneurs. The SAA will be a key stakeholder in coordinating activities related to developing financial incentives to make GWH accessible to farmers, as well as in developing outreach activities to increase the awareness of farmers on the benefits of GWH. As the technical arm of MFA, it will provide support in the design of GWH based on local conditions.

Source: TNA project

Scheduling and sequencing of specific activities

A detailed timetable for the activities can be found in the TAP planning table (**Table 31**). This TAP is planned for implementation over the period 2019-2023. For the four actions envisioned in the GWH TAP, the sequencing of Activities would be as follows:

Action 1: Remove Value Added Tax on RWH equipment – Urgent start in year 1 (Q1-2019 to Q4-2019);

Action 2: Support the development of a national water policy and Water Act – This enabling Action will be carried out at the onset of the TAP implementation and it will also form part of the PI as an urgent Action. Since multi-stakeholder coordination and meetings will be required, this Action will not be completed (i.e. policy and Water Act approved) until Q3-2020;

Action 3: **Support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and ground surface water harvesting -** Activities completed between Q1-2019 andQ1-2020; and

Action 4: **Increase public information and awareness via selected media on RWH** – The Activity will be initiated at the beginning of 2019 and will continue on a regular basis until the end of the TAP lifetime – i.e. 2023. A documentary and TV spots on RWH will be completed at the beginning of 2020.

2.1.3.5 Estimation of Resources Needed for Action and Activities

Table 31 shows the timeframe for implementing activities, the institution(s) responsible for preparation and implementation, and the costing and potential sources of funding available for each Activity related to the deployment of GWH.

Estimation of capacity building needs

As illustrated in **Table 31**, there is no need for any specific capacity building need regarding the scaling up of GWH systems in Seychelles. This is because the system is very simple and uses existing equipment.

Estimations of costs of actions and activities

The TAP will require a budget of around USD 127,000 for its implementation. Funding can be sought from international agencies (USD 122,000) but some costs would need to be borne by the Government of Seychelles (in-kind: USD5,000) as show in **Table 31**. The public institutions that will provide in-kind contributions are listed in the planning table.

2.1.3.6 Management Planning

Risks and Contingency Planning
Since theActions in the GWH TAP are identical to corresponding Actions in the RWH TAP, the risks and contingencies are therefore similar. The risks and contingencies for the Actions in the GWH TAP are as given in**Table 24.**

Next steps
Likewise, the immediate next steps and critical steps are similar for both RWH and GWH TAPs, and, therefore, not repeated here. Regarding the SC for GWH TAP, the cohort of members can be enlarged by involving the stakeholders in **Table 30** who are additional to those in **Table 23**, such as the SAA.

Table 31. Planning table - characterisation of Activities for implementation of Actions.

Action 1:	**Remove Value Added Tax on GWH equipment**									
Activities	**Planning**				**Implementation**				**Costs and funding needs**	
	Start	Complete	Who	Capacity needs	Start	Complete	Who	Capacity needs	Costs USD	Who will fund
Activity 1.1 Recruit finance legal expert to lead the process	Q1-2019	Q1-2019	MEECC	None	Q1-2019	Q2-2019	MEECC	None	25,000	Development Partners
Activity 1.2 Meetings with MFTEP to discuss regulations to be developed under VAT Act	Q1-2019	Q1-2019	MEECC	None	Q2-2019	Q4-2019	MEECC	none	1,000 (in-kind)	Government
Activity 1.3 Analyse financial impact of the proposed VAT exemption	Q2-2019	Q2-2019	MEECC/MFTEP	None	Q2-2019	Q4-2019	MEECC and MFTEP	None	Covered under Activity 1.1	Development Partners
Activity 1.4 Meetings with MEECC to define list of equipment eligible and verification process	Q2-2019	Q2-2019	MEECC	None	Q2-2019	Q2-2019	MEECC	None	1,000 (in-kind)	Government (MEECC)
Activity 1.5 Draft regulation in liaison with the Attorney General's Office	Q2-2019	Q2-2019	MEECC/MFTEP /Attorney General's Office	None	Q2-2019	Q4-2019	MEECC/MFTEP /Attorney General's Office	None	Covered under Activity 1.1	Development Partners
Activity 1.6 Prepare Cabinet ministers memorandum paper	Q2-2019	Q2-2019	MEECC/MFTEP	None	Q3-2019	Q3-2019	MEECC/MFTEP	None	Covered under Activity 1.1	Development Partners
Activity 1.7 Information session with importers of new regulation and procedures adopted	Q3-2019	Q3-2019	MEECC, MFTEP, SCCI	None	Q4-2019	Q4-2019	MEECC, MFTEP, SCCI	None	5,000	Development Partners
Action 2:	**Support the development of a national water policy and Water Act**									
Activities	**Planning**				**Implementation**				**Costs and funding needs**	
	Start	Complete	Who	Capacity needs	Start	Complete	Who	Capacity needs	Costs (USD)	Who will fund

Activity 2.1 Recruit water policy expert	Q2-2019	Q2-2019	MEECC	None	Q3-2019	Q3-2019	MEECC	None	20,000	Development Partners
Activity 2.2 Organise consultation process with keys stakeholders in the water sector	Q3-2019	Q3-2019	MEECC	None	Q4-2019	Q1-2020	MEECC	None	5,000	Development Partners
Activity 2.3 Drafting water policy and Water Act	Q1-2020	Q1-2020	MEECC	None	Q2-2020	Q2-2020	MEECC	None	Covered under Activity 3.1	Development Partners
Activity 2.4 Technical validation of water policy and Water Act	Q2-2020	Q2-2020	MEECC	None	Q3-2020	Q3-2020	MEECC	None	2,000	Development Partners
Activity 2.5 Prepare Cabinet of Minister memorandum on water policy and Water Act for approval	Q3-2020	Q3-2020	MEECC	None	Q3-2020	Q3-2020	MEECC	None	1,500 (in-kind)	Government (MEECC)
Action 3	**Support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and ground surface rainwater harvesting**									
	Planning				**Implementation**				**Costs and funding needs**	
	Start	Complete	Who	Capacity needs	Start	Complete	Who	Capacity needs	Costs (USD)	Who will fund
Activity 3.1 Recruit consultant to develop mandate ,organigram of the proposed institution	Q1-2019	Q1-2019	MEECC	None	Q2-2019	Q2-2019	MEECC	None	20,000	Development partners
Activity 3.2 Organise consultation and validation process with keys stakeholders in the water sector	Q2-2019	Q2-2019	MEECC	None	Q2-2019	Q1-2020	MEECC	None	5,000	Development partners
Activity 3.3 Determine investment and recurrent budget required	Q2-2019	Q2-2019	MEECC	None	Q3-2019	Q1-2020	MEECC	None	Covered under Activity 6.1	Development partners
Activity 3.4 Prepare cabinet ministers paper for approval	Q1-2020	Q1-2020	MEECC	None	Q1-2020	Q1-2020	MEECC	None	1,500 (in kind)	Government (MEECC)
Action 4	**Increase public information and awareness via selected media on GWH**									
	Planning				**Implementation**				**Costs and funding needs**	
	Start	Complete	Who	Capacity needs	Start	Complete step	Who	Capacity needs	Costs USD	Who will fund

Activity 4.1 Recruit lead information and awareness expert for the GWH	Q1-2019	Q1-2019	MEECC	None	Q2-2019	Q2-2019	MEECC	None	20,000	Development partners
Activity 4.2 Published article for local newspapers and existing keys website	Q2-2019	Q2-2019	MEECC	None	Q2-2019	2023	MEECC	none	2,000 (per year)	Development partners
Activity 4.3 Produce documentary on GWH	Q2-2019	Q2-2019	MEECC	None	Q3-2019	Q1-2020	MEECC	None	10,000	Development partners

Source: TNA project

Table 32 below shows a summary overview of the action plan for ground surface rainwater harvesting technology diffusion.

Table 32. TAP Summary overview for GWH technology.

Sector: WATER SECTOR								
Technology: Ground Surface Rainwater Harvesting (households)								
Ambition	**50 sites are targeted over a period of 10 years on Mahe, Praslin and La Digue**							
Benefits:	**Reduce water restriction and deficit during dry period; Contribute to 15 jobs creation and increase famers' savings from water bills**							
Action	**Activities to be implemented**	**Sources of funding**	**Responsible body and focal point**	**Time frame (yr)**	**Risks**	**Success criteria**	**Indicators for Monitoring of implementation**	**Budget per activity (USD)**
Action 1 Remove Value Added Tax on WWH equipment	1.1 Recruit finance legal expert to lead the process	Development Partners	MEECC	2019	Inability to attract high caliber consultant	High caliber consultant recruited	Recruitment of consultant	25,000
	1.2 Meetings with MFTEP to discuss regulations to be developed under VAT Act	Government	MEECC	2019	Lack of political support from MFTEP	Strong political support from MFTEP	Number of meetings held and outcomes of meetings	1,000 (in-kind)
	1.3 Analyse financial impact of the proposed VAT exemption	Development Partners	MEECC and MFTEP	2019	Poor analyses does not favour an evidence-based approach to decision making	Good analyses very supportive of decision making	Analysis of financial impacts	Covered under Activity 1.1
	1.4 Meetings with MEECC to define list of equipment eligible and verification process	Government (MEECC)	MEECC	2019	Lack of human and institutional capacity of MEECC to draft list	A meaningful eligibility list of equipment drafted	List of eligibility equipment	1,000 (in-kind)
	1.5 Draft regulation in liaison with the Attorney General's Office	Development Partners	MEECC/MFTEP /Attorney General's Office	2019	Poor quality regulation drafted	Strong regulation drafted	Draft regulation	Covered under Activity 1.1
	1.6 Prepare Cabinet ministers memorandum paper	Development Partners	MEECC/MFTEP	2019	Badly written paper leads to queries over the need for policy and Act	Cabinet Paper is approved	Approval of proposal as per Government Gazette	Covered under Activity 1.1
	1.7 Information session with importers of new regulation and procedures adopted	Development Partners	MEECC, MFTEP, SCCI	2019	Lack of interest from importers	Strong collaboration with importers leads to strong interest to promote RWH	Number of importers conversant with new regulation	5,000
Action 2 Support the development of a	2.1 Recruit water policy , legal expert	Development Partners	MEECC	2019	Inability to attract high caliber consultant	High caliber consultant recruited	Recruitment of consultant	20,000

national water policy and Water Act	2.2 Organise consultation process with keys stakeholders in the water sector	Development Partners	MEECC	2019-2020	Lack of interest from stakeholders	Strong participation of stakeholders with constructive feedbacks	Number of consultations held; number of participants	5,000
	2.3 Drafting water policy and Act	Development Partners	MEECC	2020	Poor drafts of policy and Act	High quality policy and Act drafted	Draft water policy and Water Act	Covered under Activity 3.1
	2.4 Technical validation of water policy	Development Partners	MEECC	2020	Key stakeholders do not validate the draft policy and/or Act	Draft policy and Act validated by all stakeholders	Final water policy and Water Act	2,000
	2.5 Prepare Cabinet Minister memorandum on water policy and Act for approval	Government (MEECC)	MEECC	2020	Badly written paper leads to queries over the need for policy and Act	Cabinet Paper is approved	Approval of proposal as per Government Gazette	1,500 (in-kind)
Action 3 Support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and rainwater harvesting	3.1 Recruit consultant to develop mandate, organogram of the proposed institution	Development partners	MEECC	2019	Inability to attract high caliber consultant	Mandate, organogram of new institution proposed	Mandate and organogram of new institution	20,000
	3.2 Organise consultation and validation process with keys stakeholders in the water sector	Development partners	MEECC	2019-2020	Lack of interest from stakeholders	High level of participation and contributions by key stakeholder in consultations	Number of consultations held, and number of stakeholders consulted	5,000
	3.3 Determine investment and recurrent budget required	Development partners	MEECC	2019-2020	Lack of access to information to estimate recurrent budget	Good estimate of recurrent budget obtained through high political ownership	Recurrent budget for new institution	Covered under Activity 6.1
	3.4 Prepare cabinet ministers paper for approval	Government (MEECC)	MEECC	2020	Badly written paper leads to queries over the setting up of a new institution in water sector	Cabinet Paper is approved	Approval of proposal as per Government Gazette	1,500 (in kind)
Action 4 Increase public information and awareness via selected media on GWH	4.1 Recruit lead information and awareness expert for GWH	Development partners	MEECC	2019	Inability to attract high caliber consultant	High caliber consultant recruited	Recruitment of consultant	20,000
	4.2 Published article for local newspapers and existing keys website	Development partners	MEECC	2019-2023	Low interest for media to carry publications and institutions hosting websites show little	5 newspaper publications per year and 5 websites hosting information on rooftop RWH	Number of publications per year; number of website carrying information on RWH	2,000 (per year)

					interest in project			
	4.3 Produce documentary on RWH	Development partners	MEECC	2019-2020	Low quality documentary produced	High quality documentary produced and positively impacting household awareness	Number of documentary produced; number of persons reached with documentary	10,000

Source: TNA project

2.1.4 Action Plan for Water Efficient Appliances

2.1.4.1 Introduction

The most common water efficient fixtures and appliances include double-flush toilets, showerheads and washing machines. They can simply use less water while yielding comparable performance (e.g. lower volume for similar water flow sensation, cleanliness of washing clothes). The cost of water efficient devices (fixtures and appliances) will vary for each household depending of number of toilets and showers. For a household of 4 persons, with one toilet, one shower and one efficient washing machine, it would cost approximately 8,650 SCR. The comprehensive replacement of household appliances (showers, toilets, dishwashers) with highly efficient devices can potentially reduce indoor water consumption by 35% to 50% (Government of Seychelles, 2017a; 2017b).

Annex 1 lists the members of the technical working group for the water efficient appliances technologies that were consulted during the TAP development process, and it also summarises the main benefits expected to accrue from this technology. The current status of the adaptation technology at national level is also provided.

2.1.4.2 Ambition for the TAP

25,000 households are targeted over a period of 5 years corresponding to 90% of total household nationwide.

2.1.4.3 Actions and Activities selected for inclusion in the TAP

This section provides a discussion of the Actions and Activities that have been selected to inclusion in the TAP for water efficient appliances and fixtures. Project Ideas have been proposed to start the technology transfer process by focusing on Actions and Activities of immediate urgency and that will focus on promoting an enabling environment which is supportive of other adaptation technologies.

Summary of Barriers and measures to overcome barriers

Table 33 summarises the barriers identified and measures proposed to overcome these barriers for the diffusion of water efficient appliances in household applications (Government of Seychelles, 2017b).

Table 33. Overview of barriers impeding diffusion of water efficient appliances and measures proposed to overcome them.

Categories	Identified barriers	Measures to overcome barriers
Economic and financial	• High capital cost of water efficient appliances • Water efficient appliances are not an investment priority for households, especially in the context of high upfront capital cost • Lack of cheap capital available to households (high interest rates for unsecured loans) • Lack of financial incentives for water efficient appliances	• Establish a subsidised loan scheme for water efficient appliances • Remove Value Added Tax on water efficient appliances
Legal and regulatory	• No Supportive policy and	• Support the development of a national water

Categories	Identified barriers	Measures to overcome barriers
	regulatory instrument • There are no national water efficient standards and labelling • Water efficiency standards or guidelines have not been developed for the design of new buildings or for retrofitting existing buildings.	policy and related Act • Develop national standards and labelling for water efficient appliances • Integrate water efficiency standards into the building code
Institutional and organizational capacity	There is no overreaching institution for IWRM	Support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and rainwater harvesting
Information and awareness	• Limited knowledge on water efficiency technologies • Lack of project references • Lack of awareness about issues related to water -climate change and water efficiency	• Setting up a website or webpages within another website with basic information about water efficient appliances, how it works, its benefits and contact details for local suppliers • Writing and publishing a series of articles about water efficiency for one of the local newspapers focusingon the same content as the website. • Creating and broadcasting an animated TV spot introducing water efficient appliances and its benefits • Holding a water efficient appliances exhibition in district with water efficient Suppliers, PUC, and MEECC • Establish reference project in each district

Source: Government of Seychelles, 2017b

Actions selected for inclusion in the TAP

Measures proposed were ranked in consultation with the technical group using the same criteria as for the previous water adaptation technologies. **Table 34** shows the results of the ranking of measures to be included in the TAP for water efficient fixtures.

Table 34. Framework for ranking measures for inclusion as Actions in TAP for water efficient appliances.

Measures to overcome barriers	Considerations	Assessment	Ranking
<u>Financial barriers</u> 1. Establish a subsidised loan scheme for water efficient appliances	Cost-effectiveness	yes	3 (low urgency) Access to subsidised loan scheme finance is a relatively cost-effective measure. However In comparison with the other action , this action does not rank the highest because its impacts are contingent on how
	Efficiency	yes	
	Interactions with other measures	no	
	Suitability	yes	

Measures to overcome barriers	Considerations	Assessment	Ranking
	Benefits & costs	yes	much money financiers are willing to make available and how much money households are willing to invest.
Financial barriers 2. Remove Value Added Tax on water efficient appliances	Cost-effectiveness	yes	2 (moderate urgency) VAT Exemption has a direct impact on the cost water efficiency appliances and is particularly helpful for making the technology more affordable for a larger group of household. However, tax loss for the government could be non-negligible.
	Efficiency	yes	
	Interactions with other measures	no	
	Suitability	yes	
	Benefits & costs	yes	
Legal and regulatory 3. Support the development of a national water policy and Water Act	Cost-effectiveness	yes	1 (high urgency) This is a measure of crucial importance which will set a new policy and regulatory framework for the water sector.This measure is relatively cheap as it only requires consultation with stakeholders and a support from a consultant. Importantly, it will provide the policy framework for the application of other instruments such as financial incentives, standards and labelling of fixtures and appliances and building codes, among others.
	Efficiency	yes	
	Interactions with other measures	yes	
	Suitability	yes	
	Benefits & costs	yes	
Legal and regulatory 4. Develop national standards and labelling for water efficiency	Cost-effectiveness	yes	2 (moderate urgency) This measure is important to ensure that equipment imported is of good quality and can operate within national parameters. The labelling system will ensure consumers of the performance of the water efficiency to make informed purchase decision. This measure is relatively cheap to develop as it requires consultation with stakeholders and the support of a consultant.However,implementation of the measure through the enforcement of the standards and the labelling system could be more costly for the government
	Efficiency	yes	
	Interactions with other measures	no	
	Suitability	yes	
	Benefits & costs	yes	
Legal and regulatory 5. Revised the building code to integrate water efficiency standards and guidelines	Cost-effectiveness	yes	1 (high urgency) This measure is cost effective way to integrate water efficiency into new building.It requires consultation of stakeholders and the support of a consultant.
	Efficiency	yes	
	Interactions with other measures	yes	
	Suitability	yes	
	Benefits & costs	yes	
Institutional and Organisational 6. Support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and water efficient devices in buildings	Cost-effectiveness	yes	2 (moderate urgency) This measure is crucial to promote integrated water resources management at national level.It will contribute significantly to the diffusion of water efficiency appliances at national level. However, the running costs and the establishment costs of such institution maybe important and national budget allocation may not be available
	Efficiency	yes	
	Interactions with other measures	yes	
	Suitability	yes	
	Benefits & costs	yes	

Measures to overcome barriers	Considerations	Assessment	Ranking
Information and awareness 7. Increase public information and awareness on water efficiency via media	Cost-effectiveness	yes	1 (high urgency) This measure is important to promote and diffuse the water efficiency technology among a large group of households. It is relatively cheap measure which a high potential impact
	Efficiency	yes	
	Interactions with other measures	yes	
	Suitability	yes	
	Benefits & costs	yes	
Information and awareness 8. Establish project reference in districts	Cost-effectiveness	yes	1 (high urgency) This is an effective measure which can directly demonstrate to households the benefits of water efficiency. It is a cheap measure
	Efficiency	yes	
	Interactions with other measures	no	
	Suitability	yes	
	Benefits & costs	yes	

Source: TNA project

The final selection of measures to be included in the TAP for water efficient fixtures is given in **Table 35**. The Activities for each Action retained are described in **Table 36**.

Table 35. Final selection of measures to be included as Actions in TAP for water efficient fixtures.

Categories	Identified measures to overcome barriers	Measures selected as Actions for inclusion in TAP
Economic and financial	• Establish a subsidised loan scheme for water efficient appliances • Provide an exemption of Value Added Tax for water efficient appliances	Remove Value Added Tax on water efficient appliances
Legal and regulatory	• Support the development of a national water policy and related Act • Develop national standards and labelling system for water efficient appliances • Revised the building code to integrate water efficiency standards	• Support the development of a national water policy and related Act • Develop national standards and labelling system for water efficient appliances • Revised the building code to integrate water efficiency standards
Institutional and organizational capacity	Support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and water efficiency	Support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and water efficiency
Information and awareness	• Increase public information and awareness via selected • Establish project reference in districts	• Increase public information and awareness via selected media • Establish project reference in districts

Source: TNA project

Table 36. Identification and description of specific Activities to support Actions for water efficient fixtures.

Action 1	**Remove Value Added Tax on water efficient appliances**
Action 2	**Support the development of a National Water Policy and related Act**
Action 3	**Develop national standards and labelling system for water efficiency**
Action 4	**Revise the building code to integrate water efficiency standards and**

	guidelines
Action 5	**Support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and water efficiency**
Action 6	**Increase public information and awareness via selected media on water efficiency**
Action 7	**Establish project reference on water efficiency in districts**
Activities for Action implementation	
Action 1:Remove Value Added Tax on water efficiency appliances	
Activity 1.1	Recruit finance legal expert to lead the process
Activity 1.2	Meetings with ministry of Finance to discuss regulations to be developed under VAT act
Activity 1.3	Analyse financial impact of the proposed VAT exemption
Activity 1.4	Meetings with MEECC to define list of equipment eligible and verification process
Activity 1.5	Draft regulation in liaison with the Attorney General's Office
Activity 1.6	Prepare Cabinet ministers memorandum paper
Activity 1.7	Information session with importers on new regulation and procedures adopted
Action 2:Support the development of a National Water Policy and Water Act	
Activity 2.1	Recruit Water Policy legal expert
Activity 2.2	Organise consultation process with keys stakeholders in the water sector
Activity 2.3	Drafting Water Policy and Act
Activity 2.4	Technical validation of Water Policy and Act
Activity 2.5	Prepare cabinet minister memorandum on Water Policy and Act for approval
Action 3:Develop national standards and labelling system for water efficient appliances	
Activity 3.1	Recruit standards and labelling expert for water efficient appliances
Activity 3.2	Review existing international standards and labelling system for water efficient appliances
Activity 3.3	Organise consultation process with keys stakeholders in the water sector
Activity 3.4	Draft Standards for water efficiency standards and design labelling system
Activity 3.5	Technical validation of water efficiency standards and labelling system
Activity 3.6	Prepare Cabinet Ministers paper on water efficiency standards for approval
Action 4: Revise the building code to integrate water efficiency standards and guidelines	
Activity 4.1	Recruit consultant to review and integrate standards and guidelines in the building code
Activity 4.2	Organise consultation process with keys stakeholders in the construction sector
Activity 4.3	Prepare cabinet paper for approval
Action 5: Support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and water efficiency	
Activity 5.1	Recruit consultant to develop mandate ,organigram of the proposed institution
Activity 5.2	Organise consultation and validation process with keys stakeholders in the water sector
Activity 5.3	Determine investment and recurrent budget required
Activity 5.4	Prepare cabinet ministers paper for approval
Action 6:Increase public information and awareness via selected media	
Activity 6.1	Recruit lead information and awareness expert for the water efficiency campaign
Activity 6.2	Published article for local newspapers and existing keys website
Activity 6.3	Produce TV spots on water efficiency
Action 7:Establish project reference on water efficiency in districts	

Activity 7.1	Consultation process with district administration and identification of pilot sites
Activity 7.2	Purchase and install water efficient appliances in district
Activity 7.3	Diffusion of results in the households in all districts

Source: TNA project

Actions to be selected as Project Ideas

The approach used to selecting Actions/Activities for inclusion as PIs is the same as that used for the previous TAPs. The PIs include Actions that are urgent and prerequisites for other Actions, and those that create the enabling environment for multiple adaptation technologies. Given that the TAP for water efficient appliances and devices is similar to the TAP for RWH, they have similar PIs that include:

- Action 1: Remove VAT on water efficient appliances and devices;
- Action 2: Establish National Water Policy and Water Act;
- Action 5: Setting up an overarching national water institution; and
- Action 6: Promoting public information and awareness.

2.1.3.4 Stakeholders and Timeline for implementation of TAP

Overview of Stakeholders

The roles of the main stakeholders for the implementation of the TAP for water efficient appliances and devices are given in**Table 37**.The stakeholders are similar as those identified for implemting the RWH TAP. In this case, **Table 22** has been updated to cover water efficient appliances and devices.

Table 37. Roles of main stakeholders involved in the implementation of the TAP for water efficient appliances and devices.

Key Stakeholders	Role
Public Utilities Corporation, Water Division (PUC) (All Actions)	The management of the water resources falls under the responsibility of a parastatal Agency: the PUC which is under MEECC. PUC implements the PUC Act that also defines water supply standards. The PUC has the responsibility to provide treated domestic water supply to all Seychellois in accordance with international standards for potable water. As the central player in the water sector, the PUC is a key player in all initiatives that pertain to diversify the sources of water supply and increase water productivity through water efficiency.
Ministry of Environment, Energy and Climate Change (MEECC) (All Actions)	The MEECC is the line ministry that oversees the operation of PUC. While the PUC is run by an independent Board of Directors, the Board is Chaired by the MEECC. The MEECC is also responsible for developing national policies and regulations in the water sector. It is also mandated to propose institutional reforms or restructuring in order to improve the productivity and enhanced services in the sector. MEECC can also use its position to coordinate all stakeholders in the water sector.
Seychelles Bureau of Standards (SBS) (Action 3)	The SBS is mandated to provide standardisation in relation to commodities, processes and practices.The Bureau is under the responsibility of the Ministry of Investment, Entrepreneurship Development & Business Innovation (MIEDBI). It will be responsible for developing standards for water efficient appliances and devices used in buildings proposed under Action 3.
Ministry of Finance, Trade and Economic Planning (MFTEP) (Action 1)	MFTEP is the mandated public institution to take the decision to provide financial incentives in the form of eliminating VAT on equipment and parts related to water efficient appliances and devices. Consequently, the ministry will be closely involved in the Activities pertaining to Action 1.
Ministry of Land Use and Habitat (MLUH)	The MLUH will be responsible for developing Building Codes for the integration of RWH and water efficient appliances and devices proposed

Key Stakeholders	Role
(Action 4)	under Action 4.
Seychelles Chamber of Commerce and Industry (SCCI) (Actions 1, 6 and 7)	Since the TAP is geared towards enhancing the participation of the private sector in the market for promoting water efficient appliances and devices, and given that the deployment of any technology would be supported by putting in place an appropriate value chain, it is proposed that the SCCI[4] be involved under Actions 1, 6 and 7. Further, it is necessary to include the umbrella body for the private sector in discussions related to the development of standards for water efficient appliances and devices (Action 3) and Action 7 to publicise and promote water efficient appliances and devices in buildings in districts.
Local / District Administrations (Actions 6 and 7)	A district administration operates in each of the districts under the aegis of the ministry responsible for Local Government. The primary role of the district administration is to serve as an interface between the community in the affairs of the district and promoting access to public services at the local level. It operates in partnership with local representative groups and associations, community-based public and non-government agencies, the Member of the National Assembly, and the District Community Council. District local administration will play the crucial role of interfacing with local communities for the promotion of awareness of water efficient appliances and devices (Action 6) and will be decisive in establishing project references (Action 7)
Media Houses (Action 6)	Disseminate information about the benefits of water efficient appliances and devices, including its usefulness in adapting to changes in precipitation levels due to climate change.

Source: TNA project

Scheduling and sequencing of specific activities

A detailed timetable for the activities can be found in the TAP planning table (**Table 38**). This TAP is planned for implementation over the period 2019-2023. For the seven actions envisioned in the TAP for water efficient appliances and devices, the sequencing of Activities would be as follows:

Action 1: Remove Value Added Tax on water efficient appliances and devices – Urgent start in year 1 (Q1-2019 to Q4-2019);

Action 2: Support the development of a national water policy and Water Act – This enabling Action will be carried out at the onset of the TAP implementation and it will also form part of the PI as an urgent Action. Since multi-stakeholder coordination and meetings will be required, this Action will not be completed (i.e. policy and Water Act approved) until Q3-2020;

Action 3: Develop national standards and labelling system for water efficiency – Before quality products are made available on the local market, there will be a need to establish technical standards for certifying the quality of appliances and fixtures. The Activities will start early in 2019 and the standards are expected to be approved by Q3-2020;

Action 4: Revise the building code to integrate water efficiency standards and guidelines – Activities completed between Q2-2019 andQ2-2020;

Action 5: **Support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and water efficiency -** Activities completed between Q1-2019 andQ1-2020;

[4]The SCCI is a registered association of businesses operating in Seychelles and is the most representative intermediary body of the private sector with a wide membership of some 220 members, which includes all the main economic operators in the country, as well as the main professional organisations and associations. Some of its aims are: to be the respected advisor to Government and Business on economic and fiscal policies and issues; to be an effective provider of services, support and assistance for the development of business and free enterprise; to defend business against discriminatory rules and regulations, and to be Champions of fair business practice (http://www.seychelles.travel/en/contacts/local-services/mah/seychelles-chamber-of-commerce-industry-scci - accessed 7 March 2018).

Action 6: **Increase public information and awareness via selected media on water efficiency**– The Activity will be initiated at the beginning of 2019 and will continue on a regular basis until the end of the TAP lifetime – i.e. 2023. A documentary and TV spots on water efficient appliances and devices will be completed at the beginning of 2020;

Action 7: **Establish project reference on water efficiency in districts** – Siting to install water efficient appliances and devices in districts will be completed in Q1-2019, and installation of reference systems in all districts will be carried out between Q2 and Q4 2019. Results of performance will be disseminated to households between Q3-2019 and Q2-2020.

2.1.4.5 Estimation of Resources Needed for Action and Activities

Table 38 shows the timeframe for implementation, institution responsible for preparation and implementation, and the costing and potential sources of funding available for the implementation of TAP for water efficient appliances.

Estimation of capacity building needs

As illustrated in **Table 38**, there is no need for any specific capacity building need regarding the scaling up of water efficient appliances and devices systems in Seychelles. Where needed, technical expertise will be made available through the recruitment of consultants. A learning-by-doing approach will then be adopted for skills transfer in the respective national institutions. Institutional strengthening will also be carried under Action 5.

Estimations of costs of actions and activities

The TAP would require a budget of around USD 228,000 for its implementation. Funding can be sought from international agencies (USD 220,000) but some costs would need to be borne by the Government of Seychelles (in-kind: USD8,000) as show in **Table 38**. The public institutions that will provide the in-kind contributions are listed in the planning table.

2.1.4.6 Management Planning

Risks and Contingency Planning

The main risks to the successful implementation of the TAP for water efficient appliances and devices are the same as those for RWH (**Table 24**).

Next steps

The immediate requirement to proceed with the implementation of the TAP and the proposed Project Idea (PI) is to obtain political support for the TAP. This can be secured through a two stage process, namely:

1. Cabinet approval: The MEECC, with the support of all the stakeholders listed in **Table 37** need to ensure that the validated TAP receives the approval of the Cabinet of Ministers. The Cabinet is the highest instance of decision making in government; and
2. TAP Steering Committee: The next logical step would be to put in place a Steering Committee (SC) that will oversee the execution of the TAP and PI. Given the similarities between the three TAPs for the water sector, it is proposed that the members of the SC can be constituted by the stakeholders listed in **Table 22** with functions covering both technologies for diversifying water supply (e.g. RWH and GWH) and for increasing water efficiency in buildings (water efficient appliances and devices). As mention in section 2.1.3.6, the SAA can be added to the list of stakeholders regarding GWH. The SC may be presided by the MEECC.

Three critical steps have been identified that need to be controlled in order to promote rooftop RWH. Each critical step serves to minimising risks. The critical steps are also related to the fact that the technology uptake is premised on developing synergies between Actions – i.e. overcoming barriers

and associated risks independently of each other will not lead to technology transfer. With these considerations in mind, the critical steps are:

- Appointment of Services Provider (Finance and Legal Expert) to develop regulations for VAT exemption: One of the main barriers that need to be overcome is financial. Providing incentive in the form of VAT exemption on water efficient appliances and devices is directly under the control of government, and can play a catalytic role in creating market demand for the technology;
- Conducive regulatory framework: The technology is expected to be implemented using private investments. For this to happen, market visibility supported by an appropriate national policy and supporting instruments such as legislation, regulations and standards and labelling of water efficient appliances and devices are necessary; and
- Awareness creation: Market demand can be stimulated by demonstrating the effectiveness of the proposed technology through appropriate communications, and technology demonstrations.

Table 38. Planning table - characterisation of Activities for implementation of Actions for water efficient fixtures.

Action 1:	**Remove Value Added Tax on water efficiency appliances**									
Activities	**Planning**				**Implementation**				**Costs and funding needs**	
	Start	Complete	Who?	Capacity needs	Start	Complete	Who?	Capacity needs	Costs (USD)	Who will fund?
Activity 1.1 Recruit finance legal expert to lead the process	Q1-2019	Q1-2019	MEECC	None	Q1-2019	Q2-2019	MEECC	None	25,000	Development Partners
Activity 1.2 Meetings with MFTEP to discuss regulations to be developed under VAT Act	Q1-2019	Q1-2019	MEECC	None	Q2-2019	Q4-2019	MEECC	None	1,000 (in-kind)	Government
Activity 1.3 Analyse financial impact of the proposed VAT exemption	Q2-2019	Q2-2019	MEECC/MFTEP	None	Q2-2019	Q4-2019	MEECC and MFTEP	None	Covered under Activity 1.1	Development Partners
Activity 1.4 Meetings with MEECC to define list of equipment eligible and verification process	Q2-2019	Q2-2019	MEECC	None	Q2-2019	Q2-2019	MEECC	None	1,000 (in-kind)	Government (MEECC)
Activity 1.5 Draft regulation in liaison with the Attorney General's Office	Q2-2019	Q2-2019	MEECC/MFTEP /Attorney General's Office	None	Q2-2019	Q4-2019	MEECC/MFTEP /Attorney General's Office	None	Covered under Activity 1.1	Development Partners
Activity 1.6 Prepare Cabinet ministers memorandum paper	Q2-2019	Q2-2019	MEECC/MFTEP	None	Q3-2019	Q3-2019	MEECC/MFTEP	None	Covered under Activity 1.1	Development Partners
Activity 1.7 Information session with importers of new regulation and procedures adopted	Q3-2019	Q3-2019	MEECC, MFTEP, SCCI	None	Q4-2019	Q4-2019	MEECC, MFTEP, SCCI	None	5,000	Development Partners

Action 2:	**Support the development of a National Water Policy and Water Act**									
Activities	**Planning**				**Implementation**				**Costs and funding needs**	
	Start	Complete	Who	Capacity needs	Start	Complete	Who	Capacity needs	Costs USD	Who will fund

Activity 2.1 Recruit water policy legal expert	Q2-2019	Q2-2019	MEECC	None	Q3-2019	Q3-2019	MEECC	None	20,000	Development Partners
Activity 2.2 Organise consultation process with keys stakeholders in the water sector	Q3-2019	Q3-2019	MEECC	None	Q4-2019	Q1-2020	MEECC	None	5,000	Development Partners
Activity 2.3 Drafting water policy and Act	Q1-2020	Q1-2020	MEECC	None	Q2-2020	Q2-2020	MEECC	None	Covered under Activity 3.1	Development Partners
Activity 2.4 Technical validation of water policy and Act	Q2-2020	Q2-2020	MEECC	None	Q3-2020	Q3-2020	MEECC	None	2,000	Development Partners
Activity 2.5 Prepare Cabinet of Minister memorandum on water policy and Act for approval	Q3-2020	Q3-2020	MEECC	None	Q3-2020	Q3-2020	MEECC	None	1,500 (in-kind)	Government (MEECC)
Action 3:	**Develop national standards and regulations for water efficiency appliances**									
Activities	**Planning**				**Implementation**				**Costs and funding needs**	
	Start	Complete	Who	Capacity needs	Start	Complete	Who	Capacity needs	Costs USD	Who will fund
Activity 3.1 Recruit standards expert for water efficient appliances and devices	Q2-2019	Q2-2019	MEECC/SBS	None	Q3-2019	Q3-2019	MEECC/SBS	None	25,000	Development partners
Activity 3.2 Review existing international standards on water efficiency appliances	Q3-2019	Q3-2019	MEECC/SBS	none	Q4-2019	Q4-2019	MEECC/SBS	None	Covered under Activity 4.1	Development partners
Activity 3.3 Organise consultation process with keys stakeholders in the water sector	Q4-2019	Q4-2019	MEECC /SBS	none	Q4-2019	Q2-2020	MEECC/SBS	None	5,000	Development partners
Activity 3.4 Draft scheme for water efficiency standards and labelling system	Q1-2020	Q1-2020	MEECC /SBS	none	Q2-2020	Q2-2020	MEECC/SBS	None	Covered under Activity 4.1	Development partners
Activity 3.5 Technical validation of water efficiency standards and labelling system	Q2-2020	Q2-2020	MEECC/SBS	none	Q3-2020	Q3-2020	MEECC/SBS	None	8,000	Development partners
Activity 3.6 Prepare Cabinet Ministers paper on water efficiency standards and labelling for approval	Q3-2020	Q3-2020	MEECC /SBS	none	Q3-2020	Q3-2020	SBS	None	1,500 (in-kind)	Government (SBS)
Action 4:	**Revise the building code to integrate water efficiency standards and guidelines**									

Activities	**Planning**				**Implementation**				**Costs and funding needs**	
	Start	Complete	Who	Capacity needs	Start	Complete	Who	Capacity needs	Costs USD	Who will fund
Activity 4.1 Recruit consultant to review and integrate standards and guidelines in building code	Q2-2019	Q2-2019	MEECC, MLUH	None	Q2-2019	Q2-2020	MEECC, MLUH	None	15,000	Development partners
Activity 4.2 Organise consultation process with keys stakeholders in the construction sector	Q3-2019	Q4-2019	MLUH	None	Q4-2019	Q2-2020	MLUH	None	5,000	Development partners
Activity 4.3 Prepare Cabinet Ministers paper for approval	Q2-2020	Q2-2020	MLUH	None	Q2-2020	Q2-2020	MLUH	None	1,500 (in-kind)	Government (MLUH)
Action 5	**Support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and water efficiency**									
	Planning				**Implementation**				**Costs and funding needs**	
	Start	Complete	Who	Capacity needs	Start	Complete	Who	Capacity needs	Costs (USD)	Who will fund
Activity 5.1 Recruit consultant to develop mandate ,organigram of the proposed institution	Q1-2019	Q1-2019	MEECC	None	Q2-2019	Q2-2019	MEECC	None	20,000	Development partners
Activity 5.2 Organise consultation and validation process with keys stakeholders in the water sector	Q2-2019	Q2-2019	MEECC	None	Q2-2019	Q1-2020	MEECC	None	5,000	Development partners
Activity 5.3 Determine investment and recurrent budget required	Q2-2019	Q2-2019	MEECC	None	Q3-2019	Q1-2020	MEECC	None	Covered under Activity 6.1	Development partners
Activity 5.4 Prepare cabinet ministers paper for approval	Q1-2020	Q1-2020	MEECC	None	Q1-2020	Q1-2020	MEECC	None	1,500 (in kind)	Government (MEECC)
Action 6	**Increase public information and awareness via selected media on water efficient appliances and devices, including labelling system**									
	Planning				**Implementation**				**Costs and funding needs**	
	Start	Complete	Who	Capacity needs	Start	Complete step	Who	Capacity needs	Costs USD	Who will fund
Activity 6.1 Recruit lead information and awareness expert for the water efficiency campaign	Q1-2019	Q1-2019	MEECC	None	Q2-2019	Q2-2019	MEECC	None	20,000	Development partners
Activity 6.2 Published article for local newspapers and existing website	Q2-2019	Q2-2019	MEECC	None	Q2-2019	2023	MEECC	none	2,000 (per year)	Development partners

Activity 6.3 Produce TV spots on water efficiency in buildings	Q2-2019	Q2-2019	MEECC	None	Q3-2019	Q1-2020	MEECC	None	10,000	Development partners
Action 7	**Establish project reference on water efficient appliances and devices in districts**									
	Planning				**Implementation**				**Costs and funding needs**	
	Start	Complete	Who	Capacity needs	Start	Complete	Who	Capacity needs	Costs USD	Who will fund
Activity 7.1 Consultation process with district administration and identification of pilot sites	Q1-2019	Q1-2019	MEECC, District Administrations	None	Q1-2019	Q1-2019	MEECC, District Administrations	None	10,000	Development partners
Activity 7.2 Purchase and install water efficient appliances and equipment in districts	Q1-2019	Q1-2019	MEECC, District Administrations	None	Q2-2019	Q4-2019	District Administrations	None	20,000	Development partners
Activity 7.3 Diffusion of results in the household in the districts	Q2-2019	Q2-2019	MEECC, District Administrations	None	Q3-2019	Q2-2020	MEECC, District Administrations	None	10,000	Development partners

Source: TNA project

The TAP summary for water efficient fixtures is shown in**Table 39**.

Table 39. TAP summary overview for water efficient appliances and fixtures.

Sector: WATER SECTOR								
Technology: Water Efficient Appliances and Fixtures (households)								
Ambition	**25,000 households are equipped with water efficient appliances over a 5 year period**							
Benefits:	**Reduce water restriction and deficit during dry period; contribute to 15 jobs creation and increase household savings from water bills**							
Action	**Activities to be implemented**	**Sources of funding**	**Responsible body and focal point**	**Time frame (yr)**	**Risks**	**Success criteria**	**Indicators for Monitoring of implementation**	**Budget per activity (USD)**
Action 1 Remove Value Added Tax on water efficiency appliances	1.1 Recruit finance legal expert to lead the process	Development Partners	MEECC	2019	Inability to attract high caliber consultant	High caliber consultant recruited	Recruitment of consultant	25,000
	1.2 Meetings with MFTEP to discuss regulations to be developed under VAT Act	Government	MEECC	2019	Lack of political support from MFTEP	Strong political support from MFTEP	Number of meetings held and outcomes of meetings	1,000 (in-kind)
	1.3 Analyse financial impact of the proposed VAT exemption	Development Partners	MEECC and MFTEP	2019	Poor analyses does not favour an evidence-based approach to decision making	Good analyses very supportive of decision making	Analysis of financial impacts	Covered under Activity 1.1
	1.4 Meetings with MEECC to define list of equipment eligible and verification process	Government (MEECC)	MEECC	2019	Lack of human and institutional capacity of MEECC to draft list	A meaningful eligibility list of equipment drafted	List of eligibility equipment	1,000 (in-kind)
	1.5 Draft regulation in liaison with the Attorney General's Office	Development Partners	MEECC/MFTEP /Attorney General's Office	2019	Poor quality regulation drafted	Strong regulation drafted	Draft regulation	Covered under Activity 1.1
	1.6 Prepare Cabinet ministers memorandum paper	Development Partners	MEECC/MFTEP	2019	Badly written paper leads to queries over the need for policy and Act	Cabinet Paper is approved	Approval of proposal as per Government Gazette	Covered under Activity 1.1
	1.7 Information session with importers of new regulation and procedures adopted	Development Partners	MEECC, MFTEP, SCCI	2019	Lack of interest from importers	Strong collaboration with importers leads to strong interest to promote water efficient appliances and devices	Number of importers conversant with new regulation	5,000
Action 2	2.1 Recruit water policy ,	Development	MEECC	2019	Inability to attract	High caliber	Recruitment of consultant	20,000

Support the development of a National Water Policy and Water Act	legal expert	Partners			high caliber consultant	consultant recruited		
	2.2 Organise consultation process with keys stakeholders in the water sector	Development Partners	MEECC	2019-2020	Lack of interest from stakeholders	Strong participation of stakeholders with constructive feedbacks	Number of consultations held; number of participants	5,000
	2.3 Drafting water policy and Act	Development Partners	MEECC	2020	Poor drafts of policy and Act	High quality policy and Act drafted	Draft water policy and Water Act	Covered under Activity 3.1
	2.4 Technical validation of water policy	Development Partners	MEECC	2020	Key stakeholders do not validate the draft policy and/or Act	Draft policy and Act validated by all stakeholders	Final water policy and Water Act	2,000
	2.5 Prepare cabinet minister memorandum on water policy and Act for approval	Government (MEECC)	MEECC	2020	Badly written paper leads to queries over the need for policy and Act	Cabinet Paper is approved	Approval of proposal as per Government Gazette	1,500 (in-kind)
Action 3 Develop national standards and regulations for water efficiency appliances	3.1 Recruit standards expert for water efficient appliances and devices	Development partners	MEECC/SBS	2019	Inability to attract high caliber consultant	High caliber consultant recruited	Recruitment of consultant	25,000
	3.2 Review existing international standards on water efficiency appliances	Development partners	MEECC/SBS	2019	Consultant omissions to review key international standards that would be translated into national context	International standards reviewed and appraised for local context	Number of international standards reviewed and appraisal of transposability in local context completed	Covered under Activity 4.1
	3.3 Organise consultation process with keys stakeholders in the water sector	Development partners	MEECC/SBS	2019-2020	Lack of interest from stakeholders	Strong participation of stakeholders with constructive feedbacks	Number of consultations held; number of participants	5,000
	3.4 Draft Standards for water efficiency standards and labelling system	Development partners	MEECC/SBS	2020	Poor draft standards	High quality standards drafted	Draft standards	Covered under Activity 4.1
	3.5 Technical validation of water efficiency standards and labelling system	Development partners	MEECC/SBS	2020	Key stakeholders do not validate the draft standards	Draft standards validated by all stakeholders	Final Standards	8,000
	3.6 Prepare Cabinet Ministers paper on RWH standards for approval	Government (SBS)	SBS	2020	Badly written paper leads to queries over the need to develop standards and labelling system for water efficient	Cabinet Paper is approved	Approval of proposal as per Government Gazette	1,500 (in-kind)

					appliances and devices			
Action 4 Revise the building code to integrate water efficiency standards and guidelines	4.1 Recruit consultant to review and integrate standards and guidelines in building code	Development partners	MEECC, MLUH	2019-2020	Inability to attract high caliber consultant	High caliber consultant recruited	Recruitment of consultant	15,000
	4.2 Organise consultation process with keys stakeholders in the construction sector	Development partners	MLUH	2019-2020	Lack of interest from stakeholders	Strong participation of stakeholders with constructive feedbacks	Number of consultations held; number of participants	5,000
	4.3 Prepare Cabinet Ministers paper for approval	Government (MLUH)	MLUH	2020	Badly written paper leads to queries over the need for Building Code to promote water efficient appliances and devices	Cabinet Paper is approved	Approval of proposal as per Government Gazette	1,500 (in-kind)
Action 5 Support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM and water efficiency	5.1 Recruit consultant to develop mandate, organogram of the proposed institution	Development partners	MEECC	2019	Inability to attract high caliber consultant	Mandate, organogram of new institution proposed	Mandate and organogram of new institution	20,000
	5.2 Organise consultation and validation process with keys stakeholders in the water sector	Development partners	MEECC	2019-2020	Lack of interest from stakeholders	High level of participation and contributions by key stakeholder in consultations	Number of consultations held, and number of stakeholders consulted	5,000
	5.3 Determine investment and recurrent budget required	Development partners	MEECC	2019-2020	Lack of access to information to estimate recurrent budget	Good estimate of recurrent budget obtained through high political ownership	Recurrent budget for new institution	Covered under Activity 6.1
	5.4 Prepare cabinet ministers paper for approval	Government (MEECC)	MEECC	2020	Badly written paper leads to queries over the setting up of a new institution in water sector	Cabinet Paper is approved	Approval of proposal as per Government Gazette	1,500 (in kind)
Action 6 Increase public information and awareness via selected media on water efficient	6.1 Recruit lead information and awareness expert for the water efficiency campaign	Development partners	MEECC	2019	Inability to attract high caliber consultant	High caliber consultant recruited	Recruitment of consultant	20,000
	6.2 Published article for local newspapers and existing keys website	Development partners	MEECC	2019-2023	Low interest for media to carry publications and	5 newspaper publications per year and 5 websites	Number of publications per year; number of website carrying	2,000 (per year)

appliances and devices, including labelling system					institutions hosting websites show little interest in project	hosting information on water efficient appliances and devices	information on water efficient appliances and devices	
	6.3 Produce TV spots on water efficiency in buildings	Development partners	MEECC	2019-2020	Low quality TV spots produced	High quality TV spots produced and positively impacting household awareness	Number of TV spots; number of persons reached with documentary	10,000
Action 7 Establish project reference on water efficient appliances and devices in districts	7.1 Consultation process with district administration and identification of pilot sites	Development partners	MEECC, District Administrations	2019	Lack of interest from District Administrations	One high visibility site has been identified for installation of water efficient appliances and devices in each district	List of sites identified	10,000
	7.2 Purchase and install water efficient appliances and equipment in districts	Development partners	District Administrations	2019	Poor quality products and low quality craftsmanship leads to low performance of systems	Water efficient appliances and devices are installed in each district and performing well	List of equipment by district; volume of water harvested for each district; number of queries received from communities	50,000
	7.3 Diffusion of results in the household in the district	Development partners	MEECC, District Administrations	2019-2020	Poor communication due to little follow up on the project because of lack of political will from District Administrations	The performance of each system is disseminated widely to the population and awareness is high among potential end users	Level of awareness of population and propensity to purchase water efficient appliances and devices	10,000

Source: TNA project

2.2 Project Ideas for the Water Sector

2.2.1 Brief summary of the Project Ideas for the Water Sector

The TAPs described in this document are designed with specific Actions and Activities in mind that are interrelated and will together contribute to the successful application of the proposed technologies. The previous discussions have shown that there are many similarities between the TAPs for the prioritised adaptation technologies in the water sector. This is the reason behind the similarities behind the proposed PIs for each technology. A significant feature of the PIs is that they contain activities that provide an enabling framework that is supportive of all three adaptation technologies in the water sector. This is the reason why this report does not contain a separate discussion of the enabling framework to promote the technologies. The proposed PIs are effective vehicles for creating the enabling conditions to promote technology diffusion and scaling up.

The Actions and Activities proposed in the PIs can be implemented quickly, while waiting for the larger funds needed to implement the remaining parts of each action plan.

The PIs for the water sector are:

1. **Project Idea 1 -VAT exemption on water adaptation technologies**: All three technologies are consumer goods, and price is a key determinant for stimulating buying behaviour. Financial incentives are therefore an effective means of stimulating market demand for the adaptation technologies. Since the analyses for investigating the impacts of VAT exemption on (i) creating market demand for technologies, and (ii) government revenues are similar, the proposed studies required to set up the financial incentive can be bundled up;
2. **Project Idea 2 – Policy and regulatory framework to support adaptation in the water sector**: Currently, there is no National Water Policy in the Seychelles to promote efficient, equitable and sustainable use of water resources. The PUC Act is mainly a water services Act. The PI will provide a coherent policy framework with accompanying legal instrument for promoting the sustainable use of water resources in Seychelles, while also addressing the detrimental impacts of climate change and climate variability on the sector.
3. **Project Idea 3 – Institutional design for enhanced water management**: Within the broader ambit of Project Idea 2 it would be useful for Seychelles to adopt IWRM as a systemic approach to managing water resources at all levels. Consequently, there will be the need to set up the appropriate institutional arrangement; and
4. **Project Idea 4 – Stimulating market demand through public awareness**: In support of the financial incentive, creating consumer awareness on the benefits of the adaptation technologies is a reinforcing element in stimulating their market demand. This PI will focus mainly on the adaptation technologies that are targeted to households – i.e. RWH and water efficient appliances and devices – because of the scale and ambition of targets. Also, GWH would require a more limited awareness campaign targeting only selected farmers.

2.2.2 Specific Project Ideas

The PIs for the water sector are summarised in**Table 40**, **Table 41**, **Table 42** and **Table 43**.

Table 40. Project Idea 1 - VAT exemption on water adaptation technologies.

Introduction/ Background	All three technologies are consumer goods, and price is a key determinant for stimulating buying behaviour. Financial incentives are therefore an effective means of stimulating market demand for the adaptation technologies. Since the analyses for investigating the impacts of VAT exemption on (i) creating market demand for technologies, and (ii) government revenues are similar, the proposed studies required to set up the financial incentive can be bundled up.
Objectives	1. To stimulate the update of water supply diversification technologies such as RWH and GWH, and increasing productive use of water in households through water efficient appliances and fixtures 2. To reduce dependency on piped water supply as a response to adapting to the impacts

	of climate change on water availability
What are the outputs and are they measurable?	1. The main output of this PI will be an established list of equipment and parts related to RWH and GWH systems, and water efficient appliances and devices that are exempted from VAT 2. A secondary output will be the studies on the macroeconomic impacts of the VAT exemption that will serve as the evidence to justify the financial incentives
Relationship to the country's sustainable development priorities	Climate change adaptation in the water sector is a key priorityof the Government of Seychelles. Adaptation technologies in the water sector have been identified as national priorities in the National Climate Change Strategy (2009) and the Seychelles Nationally Determined Contribution (2015).
Project Deliverables e.g. Value/Benefits/ Messages	1. An educated public that understands the usefulness of the proposed technologies (RWH, GWH and water efficient appliances and devices) to adapt to the impacts of climate change on water availability 2. A list of equipment and parts that will be exempted from VAT
Project Scope and Possible Implementation	It is a national project and broad in scope as it effectively targets all households and farmers in Seychelles. It is feasible since there are examples where government has provided VAT exemption on equipment and parts to support it commitment to combating climate change, and in particular solar PV equipment
Project activities	1. Recruit finance legal expert to lead the process 2. Meetings with MFTEP to discuss regulations to be developed under VAT Act 3. Analyse financial impact of the proposed VAT exemptions 4. Meetings with MEECC to define list of equipment eligible and verification process 5. Draft regulation in liaison with the Attorney General's Office 6. Prepare Cabinet ministers memorandum paper 7. Information session with importers of new regulation and procedures adopted
Timelines	This project is envisioned for implementation in 2019
Budget/Resource requirements (What is the budget? How is the project to be funded? /Staff, Engaging consultants, partnership, etc.)	1. The budget would be about USD 96,000 (grant from development partners: USD 90,000; government in-kind: USD 8,000) 2. The project would be coordinated by the MEECC with strong support from MFTEP but some activities will be contracted out to consultants as per summary of TAPs 3. The SCCI and its relevant members, and other companies dealing in the adaptation technologies will be involved in Activity 7
Measurement/ Evaluation (What tangible evaluation of accomplishments will be conducted? How will the success be measured?)	The main indicators that will be used to track performance are: 1. A list of equipment and parts that are eligible for VAT exemption 2. The approved regulation as per Government Gazette 3. The number of importers conversant with new regulation 4. Report on the macroeconomic impacts of the VAT exemption scheme =
Possible Complications/ Challenges	• Inability to attract high caliber consultantleading to poor macroeconomic analyses and poor quality draft macroeconomic analyses • Lack of political support from MFTEP • Lack of human and institutional capacity of MEECC to draft list of equipment and parts that should receive VAT exemption • Lack of interest from importers and suppliers of adaptation technologies
Responsibilities and Coordination	The MEECC will be responsible for implementing the PI in close collaboration with MFTEP.

Source: TNA project

Table 41. Project Idea 2 – Policy and regulatory framework to support adaptation in the water sector.

Introduction/	Currently, there is no National Water Policy in the Seychelles to promote efficient,

Background	equitable and sustainable use of water resources. The PUC Act is mainly a water services Act. The PI will provide a coherent policy framework with accompanying legal instrument for promoting the sustainable use of water resources in Seychelles, while also addressing the detrimental impacts of climate change and climate variability on the sector.
Objectives	1. To establish a coherent policy framework for the water sector that will also support adaptation technologies 2. To develop legislation in the form of a Water Act to implement the policy
What are the outputs and are they measurable?	The main outputs of this PI will be: 1. A National Water Policy, and 2. A Water Act
Relationship to the country's sustainable development priorities	Climate change adaptation in the water sector is a key priorityof the Government of Seychelles. Adaptation technologies in the water sector have been identified as national priorities in the National Climate Change Strategy (2009) and the Seychelles Nationally Determined Contribution (2015).
Project Deliverables e.g. Value/Benefits/ Messages	1. A policy framework that is supportive of climate change adaptation in the water sector 2. A legal framework that operationalises the water policy, including the definition of the roles and responsibilities of all parties in the water sector 3. An overarching national framework for justifying investments in the prioritised adaptation technologies
Project Scope and Possible Implementation	The PI is very specific in scope, and it serves to bridge a cap that exists in the policy landscape in Seychelles. Its implementation is feasible since development of policies and legislations are routinely carried out by line ministries. Hence, the proposed PI falls squarely within the mandate of the MEECC.
Project activities	1. Recruit water policy and legal expert to lead the process 2. Organise consultation process with keys stakeholders in the water sector 3. DraftNational Water Policy and Water Act 4. Carry out technical validation of Water Policy 5. Prepare Cabinet Ministers memorandum on Water Policy and Water Act
Timelines	This project is envisioned for implementation in 2019 and 2020
Budget/Resource requirements (What is the budget? How is the project to be funded? /Staff, Engaging consultants, partnership, etc.)	1. The budget would be about USD 28,500 (grant from development partners: USD 27,000; government in-kind: USD 1,500) 2. The project would be led and coordinated by the MEECCthat has the mandate to develop policy for the water sector 3. Some activities (2, 3 and 4) will be contracted out to consultants as per summary of TAPs
Measurement/ Evaluation (What tangible evaluation of accomplishments will be conducted? How will the success be measured?)	The main indicators that will be used to track performance are: 1. Draft and approved National Water Policy and Water Act (as per Government Gazette) 2. Number of consultations held; number of participants
Possible Complications/ Challenges	• Inability to attract high caliber consultantleading to weak policy document and poor draft Water Act • Lack of interest from stakeholders • Lack of political support from MEECC to develop policy
Responsibilities and Coordination	The MEECC will be responsible for implementing the PI in close collaboration with main stakeholders as defined in **Table 30** and**Table 37**.

Source: TNA project

Table 42. Project Idea 3 – Institutional design for enhanced water management.

Introduction/ Background	Within the broader ambit of Project Idea 2 it would be useful for Seychelles to adopt IWRM as a systemic approach to managing water resources at all levels. Consequently, there will be the need to set up the appropriate institutional arrangement.
Objectives	1. To support the establishment of an overreaching national water institution with water committees at the district level for promoting IWRM 2. To provide institutional support for the transfer and diffusion of adaptation technologies in the water sector
What are the outputs and are they measurable?	The main outputs of this PI will be: 1. The mandate and organogram of the overarching national institutions, and 2. An estimation of the recurrent budget that will be required to operationalise the institution
Relationship to the country's sustainable development priorities	Climate change adaptation in the water sector is a key priorityof the Government of Seychelles. Adaptation technologies in the water sector have been identified as national priorities in the National Climate Change Strategy (2009) and the Seychelles Nationally Determined Contribution (2015).
Project Deliverables e.g. Value/Benefits/ Messages	1. A coherent institutional arrangement for the management of water resources in an integrated way and involving decentralised water management responsibilities at the district level 2. Enhancing the institutional mandate for adaptation technologies to be promoted by District Administration as part of their mandate to contribute towards sustainable water management
Project Scope and Possible Implementation	The PI is very specific in scope, and it serves to bridge a cap that exists in the institutional landscape in Seychelles. Its implementation is feasible since the proposed PI falls squarely within the mandate of the MEECC.
Project activities	1. Recruit consultant to develop mandate, organogram of the proposed institution 2. Organise consultation and validation process with keys stakeholders in the water sector 3. Determine investment and recurrent budget required 4. Prepare Cabinet Ministers memorandum on Water Policy and Water Act
Timelines	This project is envisioned for implementation in 2019 and 2020
Budget/Resource requirements (What is the budget? How is the project to be funded? /Staff, Engaging consultants, partnership, etc.)	1. The budget would be about USD 26,500 (grant from development partners: USD 25,000; government in-kind: USD 1,500) 2. The project would be led and coordinated by the MEECC that has the mandate to propose an institutional framework for the water sector 3. Some activities (2 and 3) will be contracted out to consultants as per summary of TAPs
Measurement/ Evaluation (What tangible evaluation of accomplishments will be conducted? How will the success be measured?)	The main indicators that will be used to track performance are: 1. Mandate and organogram of new institution 2. Recurrent budget for new institution 3. Number of consultations held; number of participants
Possible Complications/ Challenges	• Inability to attract high caliber consultantleading to poor institutional arrangement and erroneous estimate of recurrent budget • Lack of interest from stakeholders • Lack of political support from MEECC to set up proposed institution
Responsibilities and Coordination	The MEECC will be responsible for implementing the PI in close collaboration with main stakeholders as defined in **Table 30** and**Table 37**.

Source: TNA project

Table 43. Project Idea 4 – Stimulating market demand through public awareness.

Introduction/ Background	In support of the financial incentive (Project Idea 1), creating consumer awareness on the benefits of the adaptation technologies is a reinforcing element in stimulating their market demand. This PI will focus mainly on the adaptation technologies that are targeted to households – i.e. RWH and water efficient appliances and devices – because of the scale and ambition of targets.
Objectives	1. To create awareness among the population on the benefits of RWH and water efficient appliances and fixtures as water adaptation technologies 2. To stimulate the demand of the adaptation technologies
What are the outputs and are they measurable?	The main outputs of this PI will be: 1. Publications in newspapers and featured on websites regarding the different types, use and benefits of RWH systems and water efficient appliances and devices, and 2. A document and TV spots to demonstrate the different types, use and benefits of RWH systems and water efficient appliances and devices
Relationship to the country's sustainable development priorities	Climate change adaptation in the water sector is a key priorityof the Government of Seychelles. Adaptation technologies in the water sector have been identified as national priorities in the National Climate Change Strategy (2009) and the Seychelles Nationally Determined Contribution (2015).
Project Deliverables e.g. Value/Benefits/ Messages	1. Publications and TV campaigns to increase the public's awareness of the different features of the adaptation technologies, as well as their usefulness to save water and reduce the water bill of households
Project Scope and Possible Implementation	The PI is very specific in scope, and it is concerned about developing an awareness campaign using printed, online and audio-visual means to reach the population regarding the types, uses and benefits of RWH systems and water efficient appliances and devices. Its implementation is feasible since the proposed PI falls squarely within the mandate of the MEECC that has the prior experience to run such campaigns.
Project activities	1. Recruit lead information and awareness expert 2. Published article for local newspapers and existing keys website 3. Produce documentary and TV spots on RWH systems and use of efficient appliances and devices in houses
Timelines	This project is envisioned for implementation in 2019 and 2023
Budget/Resource requirements (What is the budget? How is the project to be funded? /Staff, Engaging consultants, partnership, etc.)	4. The budget would be about USD 60,000 in the form of a grant from development partners 5. The project would be led and coordinated by the MEECC that has the mandate to enhance public awareness regarding water-related issues in Seychelles 6. Some activities (2 and 3) will be contracted out to consultants as per summary of TAPs
Measurement/ Evaluation (What tangible evaluation of accomplishments will be conducted? How will the success be measured?)	The main indicators that will be used to track performance are: 1. Number of publications per year 2. Number of websites carrying information on RWH and water efficient appliances and devices 3. Number of documentaries produced 4. Number of TV spots and number of times features on air 5. Number of persons reached by documentary and TV spots
Possible Complications/ Challenges	• Inability to attract high caliber consultantleading to poor design awareness campaign • Low interest for media to carry publications and institutions hosting websites show little interest in project
Responsibilities and Coordination	The MEECC will be responsible for implementing the PI in close collaboration with main stakeholders as defined in **Table 22** and**Table 37**.

Source: TNA project

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Annex 1. List of stakeholders involved and their contacts

COASTAL ZONE SECTOR

Prioritised technology for this TAP	**Coastal Risk Monitoring and Mapping**	
Stakeholders involved		
NAME	**ORGANISATION**	**CONTACT DETAILS**
Cliff Zelia	Seychelles Coast Guard	cliff.dzelia@gmail.com
Samuel King	Seychelles Coast Guard	Samuel2king@gmail.com
Rodney Quatre	UNDP/MEECC project coordinating unit	r.quatre@undp.org
Jude Bijoux	UNDP/MEECC project coordinating unit	judebijoux@gmail.com
Helena Sims	The Nature Conservancy (MSP Project)	helena.sims@tnc.org
David Rowat	Marine Conservation Society of Seychelles	david@mcss.sc
Justin Prosper	MEECC - GIS UNIT	j.prosper@env.gov.sc
Mersiah Rose	MEECC - GIS unit	m.rose@env.gov.sc
Elvina Henriette	Independent consultant	elvinahenr@gmail.com
Jonathan Pinchart	Independent consultant	jonathan.pinchart@hotmail.fr
Nimhan Senaratne	Civil Engineer - EcoSol	nimhan158@gmail.com
Marc D'Offay	Civil Engineer	madoffay@gmail.com
Selvan Pillay	MEECC – Climate Adaptation and Management Section	s.pillay@gov.sc
Annie Simeon	MEECC – Climate Adaptation and Management Section	annie.simeon@env.gov.sc
Benefits from this technology		
Climate change mitigation	n/a	
Climate change adaptation	Inform science-based decision making about coastal protection measures /developments	
Social development	Improved acceptance of importance of science-based decision making	
Environmental protection	Better understanding of best methods to protect coastal ecosystems	
Economic development	Improve planning to protect critical infrastructure and developments along vulnerable areas of the coast of the main three islands.	
Current status of technology at country level	Sporadic diffusion at national level, lack of coordination.	
Other explanations in support of prioritisation of this technology	High level of acceptability of the technology by households	

Prioritised technology for this TAP	**Coastal Ecosystem Restoration: Dunes and Wetlands**	
Stakeholders involved		
NAME	**ORGANISATION**	**CONTACT DETAILS**
Rodney Quatre	UNDP/MEECC project coordinating unit	r.quatre@undp.org
Jude Bijoux	Independent consultant	judebijoux@gmail.com
Betty Seraphine	UNDP/MEECC project coordinating unit	b.seraphine@gmail.com
Johan Mendez	UNDP/MEECC project coordinating unit	j.mendez@pcusey.sc
James Millet	UNDP/MEECC project coordinating unit	j.millet@pcusey.sc
David Rowat	Marine Conservation Society of Seychelles	david@mcss.sc
Vanessa Zialor	Sustainability for Seychelles	zialorvz@gmail.com
Justin Prosper	MEECC - GIS UNIT	j.prosper@env.gov.sc
Elvina Henriette	Independent consultant	elvinahenr@gmail.com

Nimhan Senaratne	Civil Engineer - EcoSol	nimhan158@gmail.com
Marc D'Offay	Civil Engineer	madoffay@gmail.com
Selvan Pillay	MEECC – Climate Adaptation & Management Section	s.pillay@gov.sc
Pugazendi Murugaiyan	MEECC – Climate Adaptation & Management Section	p.murugaiyan@env.gov.sc
Annie Simeon	MEECC – Climate Adaptation & Management Section	annie.simeon@env.gov.sc
Benefits from this technology		
Climate change mitigation	Some carbon sequestration due to vegetation/replanting	
Climate change adaptation	Natural protection of coast through ecosystem services	
Social development	Enhanced coastal leisure areas and opportunities for community involvement	
Environmental protection	Enhanced and protected coastal ecosystems	
Economic development	Enhanced aesthetic appeal of coastal protection measures will benefit tourism activities along the coast compared to hard engineering solutions	
Current status of technology at country level	Low diffusion at national level	
Other explanations in support of prioritization of this technology	High level of acceptability of the technology by specialists in environment sector	

WATER SECTOR

Prioritised technology	**Rooftop Rainwater Harvesting**	
Stakeholders involved	**Name & Institute**	**Contact information**
	Steve Mussard , PUC	smussard@puc.sc
	Franky Dupres, PUC	fdupres@puc.sc
	Johan Mendez, Programme Coordination Unit	j.mendez@pcusey.sc
	Betty Seraphine, Programme Coordination Unit	b.seraphine@pcusey.sc
	Betty Mondon, Programme Coordination Unit	b.mondon@pcusey.sc
	Michele Martin, Sustainability for Seychelles	mpmartinsey@gmail.com
	Vanessa Zialor, Sustainability for Seychelles	zialorvz@gmail.com
Benefits from this technology		
Climate change adaptation	Reduction in demand of treated water, reduction of water deficit during dry season	
Social development	Savings in water bills, potential jobs creation in the supply demand chain	
Environmental protection	reduction in wastage and more efficient use of treated water, the overall dam extension environmental impact avoided	
Economic development	Increased water availability contributes directly to sustainable development	
Current status of technology at country level	Low diffusion at national level	
Other explanations in support of prioritisation of this technology	High level of acceptability of the technology by households	

Prioritised technology for this TAP	Ground Surface Rainwater Harvesting (GWH) technology	
Stakeholders involved	**Name & Institute**	**Contact information (email, tel.)**
	Steve Mussard , PUC	smussard@puc.sc
	Franky Dupres, PUC	fdupres@puc.sc
	Johan Mendez, Programme Coordination Unit	j.mendez@pcusey.sc
	Betty Seraphine, Programme Coordination Unit	b.seraphine@pcusey.sc
	Betty Mondon, Programme Coordination Unit	b.mondon@pcusey.sc
	Michele Martin, Sustainability for Seychelles	martinzanli@gmail.com
	Vanessa Zialor, Sustainability for Seychelles	zialorvz@gmail.com
Benefits from this technology *Climate change mitigation*	n.a	
Climate change adaptation	Reduction of demand of treated water, reduction of water deficit during dry season	
Social development	Savings in water bills, 15 potential jobs created in the supply demand chain	
Environmental protection	reduction in wastage and more efficient use of treated water, the overall dam extension environmental impact avoided	
Economic development	Increase water availability contributes directly to agricultural production	
Current status of technology at country level	Low diffusion at national level	

Prioritised technology for this TAP	Rooftop Rainwater Harvesting	
Stakeholders involved	**Name & Institute**	**Contact information (email)**
	Steve Mussard , Public Utilities Corporation	smussard@puc.sc
	Franky Dupres, Public Utilities Corporation	fdupres@puc.sc
	Johan Mendez, Programme Coordination Unit	j.mendez@pcusey.sc
	Betty Seraphine, Programme Coordination Unit	b.seraphine@pcusey.sc
	Betty Mondon, Programme Coordination Unit	b.mondon@pcusey.sc
	Michele Martin, Sustainability for Seychelles	martinzanli@gmail.com
	Vanessa Zialor, Sustainability for Seychelles	zialorvz@gmail.com
Benefits from this technology *Climate change mitigation*	n.a	
Climate change adaptation	Reduction in demand of treated water, reduction of water deficit during dry season	

Social development	Savings in water bills, potential jobs creation in the supply demand chain
Environmental protection	reduction in wastage and more efficient use of treated water, the overall dam extension environmental impact avoided
Economic development	Increase water availability contributes directly to sustainable development
Current status of technology at country level	Low diffusion at national level
Other explanations in support of prioritisation of this technology	High level of acceptability of the technology by households