Secretariat of the Pacific Community
Government of the Kingdom of Tonga
GLOBAL CLIMATE CHANGE ALLIANCE: PACIFIC SMALL ISLAND STATES
PROJECT DESIGN DOCUMENT

Trialling Coastal Protection Measures in eastern Tongatapu

Project Summary

The overall objective of the project is to increase resilience to climate change impacts in Tonga. The purpose is to trial coastal protection measures in eastern Tongatapu using a coastal engineering approach called "Buying time through managed advance". This involves using specially designed coastal protection measures to prograde the coastline seaward while recognising that the measures will only "buy time" possibly for decades. It is envisaged that coastal communities in the affected area will need to consider other options such as relocation in the coming decades. The implementation period for this project will begin immediately after the required parties have signed the agreement and ends on 19th November 2014. However, a request for extension of the entire Global Climate Change Alliance: Pacific Small Island States (GCCA: PSIS) project is currently being submitted by SPC to the European Union.

The key result areas are as follows: (i) Education and awareness on coastal management in the context of climate change enhanced in Tonga; (ii) Coastal adaptation measures involving hard and soft protection elements identified, designed and constructed for a vulnerable coastal community in eastern Tongatapu; (iii) Effectiveness of the coastal protection measures monitored, in collaboration with other related projects; and (iv) Capacity of key stakeholders in Tonga enhanced to plan for coastal change in the context of climate variability and change.

The project will strengthen the capacity of the Ministry of Lands, Environment, Climate Change and Natural Resources (MLECCNR) and the Ministry of Infrastructure to design, monitor and manage coastal protection measures within a framework of overall coastal management, such that in the long term the country moves from a piecemeal approach to an overall and integrated approach to coastal management which also includes climate change adaptation. Specifically the project will provide technical assistance to design, construct and monitor coastal protection measures in eastern Tongatapu. The proposed measures have already been designed and accepted by the government agencies and the community and civil society stakeholders. They consist of (i) construction of permeable groynes together with sand recharge and coastal planting in front of Talafo'ou and Makaunga villages; (ii) building small detached breakwaters, combined with sand recharge and mangrove planting to the east of Manuka village. Training in coastal processes and monitoring will also be provided to government agencies, NGOs, communities, and schools. Education and awareness about coastal management and the wider field of climate change adaptation are also an integral part of the project. Collaboration with the Strategic Program for Climate Resilience, funded by the Asian Development Bank and scheduled to commence in 2014, will ensure that the lessons learnt from the GCCA: PSIS trialled coastal protection measures can be incorporated into additional coastal protection measures planned for eastern Tongatapu. The preparation of an integrated coastal management plan will help Tonga move towards adopting an overall approach to coastal planning and moving away from the present piecemeal approach.

The project is consistent with Tonga's Joint National Action Plan for Climate Change Adaptation and Disaster Risk Management (2010-2015), specifically Goal 3: Analysis and assessments of vulnerability to climate change and disaster impacts which identifies addressing coastal erosion as a priority action.

Map of Kingdom of Tonga

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Country: TONGA

1. INTRODUCTION

The Global Climate Change Alliance: Pacific Small Island States Project (GCCA: PSIS) is a three-year project funded by the European Union and executed by the Secretariat of the Pacific Community (SPC). The overall objective of the GCCA: PSIS project is to support the governments of nine smaller Pacific Island states, namely Cook Islands, Federated States of Micronesia, Kiribati, Marshall Islands, Nauru, Niue, Palau, Tonga and Tuvalu, in their efforts to tackle the adverse effects of climate change. The purpose of the project is to promote long-term strategies and approaches to adaptation planning and pave the way for more effective and coordinated aid delivery to address climate change at the national and regional level.

The GCCA: PSIS project is implemented by SPC as part of its 'whole of organization approach' and is one of the activities contributing to the SPC Climate Change Engagement Strategy. The four key result areas (KRA) of the GCCA: PSIS project are:

National Level Key Result Areas

- KRA 1: Supporting national efforts to successfully mainstream climate change into national and sector response strategies.
- KRA 2: Identifying, designing and supporting the implementation of adaptation activities.

Regional Level Key Result Areas

- KRA 3: Enhancing the contribution of regional organisations to national adaptation responses.
- KRA 4: Building regional capacity to coordinate the delivery of streamlined adaptation finance and targeted technical assistance to countries.

Tonga, as one of the countries participating in this project, has highlighted its adaptation needs at various regional and international fora and in official documents, in particular the 2010 Joint National Action Plan on Climate Change Adaptation and Disaster Risk Management (JNAP) and the vulnerability and adaptation assessment conducted as part of the preparation of Tonga's Second National Communication under the United Nations Framework Convention on Climate Change (UNFCCC).

The preparation of Tonga's JNAP involved extensive consultation throughout the country and the preparation of a prioritised list of costed actions required to implement the JNAP over the period 2010-2015. The design and implementation of coastal protection measures to address ongoing serious coastal erosion was identified as a priority action under Goal 3: Analysis and assessments of vulnerability to climate change and disaster impacts. The prioritised list identified coastal protection in eastern Tongatapu as a specific need, and was estimated to cost USD5.0 million.

A feasibility study, coastal design and costing for this eastern Tongatapu was conducted in 2012 by CTL Consultants, under the direction of the Ministry of Environment and Climate

Change and funded by the Government of Australia under the International Climate Change Adaptation Initiative. An environmental impact assessment was undertaken in 2012.

Whilst the funding available under the GCCA: PSIS project for a climate change adaptation activity was insufficient to meet the full cost of implementing coastal protection measures in eastern Tongatapu, the Government of Tonga requested that the funds be utilised to start implementation along selected coastal sections. This would then lay the groundwork for other follow-on projects e.g. the Asian Development Bank (ADB)-funded Strategic Program for Climate Resilience which could then implement measures in additional coastal sections.

This project design document (PDD) outlines the overall objective, purpose, key result areas and activities that comprise the project. The project design follows the logical framework approach. This first section of the PDD outlines the background to the project, its rationale and related projects. Section two describes how the project was identified. The third section describes the project's overall objectives, purpose, key result areas and activities using a logical framework approach while the fourth and fifth sections of the document provide a schedule and budget for the project activities. Institutional arrangements and risk management and exit strategies are the content of sections 6 and 7 respectively.

Background

The Kingdom of Tonga comprises a total area of 748 km^2 with total land area of 718 km^2 and 419 km of coastline. The country has a total of 172 islands, 36 of which are inhabited. The estimated population of Tonga in 2006 (July) is 114,689.

Tonga consists of four island groupings spread over a south-north axis: Tongatapu and 'Eua (south), Ha'apai (central); (Vava'u (north); Niuafo'ou and Niua Toputapu (far north). In 1996 Tongatapu was the most populous island accounting for 69% of the total population.

Tonga, a small, open, South Pacific island economy, has a narrow export base in agricultural goods. Squash, coconuts, bananas, and vanilla beans are the main crops, and agricultural exports make up two-thirds of total exports. The country imports a high proportion of its food, mainly from New Zealand. The country remains dependent on external aid and remittances from Tongan communities overseas to offset its trade deficit. Tourism is the second-largest source of hard currency earnings following remittances. The government is emphasizing the development of the private sector, especially the encouragement of investment, and is committing increased funds for health and education. Tonga has a reasonably sound basic infrastructure and well-developed social services. High unemployment among the young, a continuing upturn in inflation, pressures for democratic reform, and rising civil service expenditures are major issues facing the government.

Climate and Climate Change Projections for Tonga

There is a marked diurnal, seasonal and spatial variation in temperature. Mean annual temperatures vary according to latitude from 27°C at Niuafo'ou and Keppel (northernmost

island) to 24°C at Tongatapu (in the south). Diurnal and seasonal variations can reach as high as 6°C throughout the island group.

There is also a marked seasonality in the rainfall of Tonga between wet (November–April) and dry (May–October) seasons. The annual mean (1971–2007) rainfall for the five meteorological stations in Tonga show Tongatapu received on average of 1,721 mm, Vava'u 2,150 mm, Ha'apai 1,619 mm, Niuafo'ou 2,453 and Niua Toputapu 2,374 mm. Interannual variation of rainfall is high and is influenced by the El Niño-Southern Oscillation (ENSO). The country is vulnerable to long dry spells associated with the El Niño phase and is also vulnerable to cyclones during the summer months of November-April.

Future projections for climate change in Tonga show the following changes over the next 20 to 30 years: (i) average air temperatures will increase by +1.0 to +1.8^{o}C; (ii) projections for future trends in rainfall are not clear but indicate a general decrease in dry season rainfall and an increase in wet season rainfall with an increase in extreme rainfall events; (iii) increase in sea surface temperatures; (iv) increase in ocean acidification; and (v) sea level will continue to rise. Projects about the future behaviour of extremes, including cyclones, and the future behaviour of ENSO show a range of uncertainties at the moment.

Rationale

The coastal communities that are the focus of this project, namely Nukuleka, Makaunga, Talafo'ou, Navutoka, Manuka and Kolonga are situated on the northeastern coast of Tongatapu (Figure 1). The six villages frontages are less than 2m above sea level rendering them highly vulnerable to the impacts of climate change, disaster risks, sea level rise, storm surge and coastal erosion issues. There are 3,367 people living in the six villages in this area and 566 properties.

Figure 1 Northern coast of eastern Tongatapu

Aerial photography and discussions with local communities from the study area indicate that the coast has been subject to serious erosion since 1968, up 20-30 m in some places, although there is considerable variation. Coastal erosion has been arrested by the coastal road, which is holding the line and acts as a sea wall. However, despite upgrading in 2011 the coastal road is itself under threat in many places and recent cyclone activity has uprooted trees whose root systems have been undermined by continuing erosional pressures. Attempts have been made in places to arrest erosional pressures, but these have been unsuccessful and, furthermore, failure to understand the dynamics of coastal processes has meant that attempts to put in place coastal protection have led to enhanced erosional pressures downstream.

The most significant change to the land environment in the project area has been the conversion of the coastal road from a track to a more permanent and fixed tarmac structure; this effectively acts as a seawall separating the marine and coastal environment and land environment. This has implications for coastal evolution as the coastal margin is fixed creating increased erosional pressures. A further consequence of the tarmacking of the road has been that its level has been raised such that any flooding on the landward side cannot drain seaward as there is no provision of drainage across the barrier formed by the road. The impact of the coastal road has been compounded by a loss of sediment from the beaches, probably through sand mining for building construction, leading to a loss of beach frontage and erosion of the thin land margin between the road and beach. These were the main findings of the 2012 report by CTL Consultants.

The study also divided the coast into behaviour units based on geomorphology, oceanography and past history (see Figure 3) and then designed engineering options suitable for each behaviour unit. Following this comprehensive assessment of the coast, an environmental impact assessment was conducted by GEOCARE & Petroleum Consult Ltd which reviewed the different options and prepared an environmental monitoring plan.

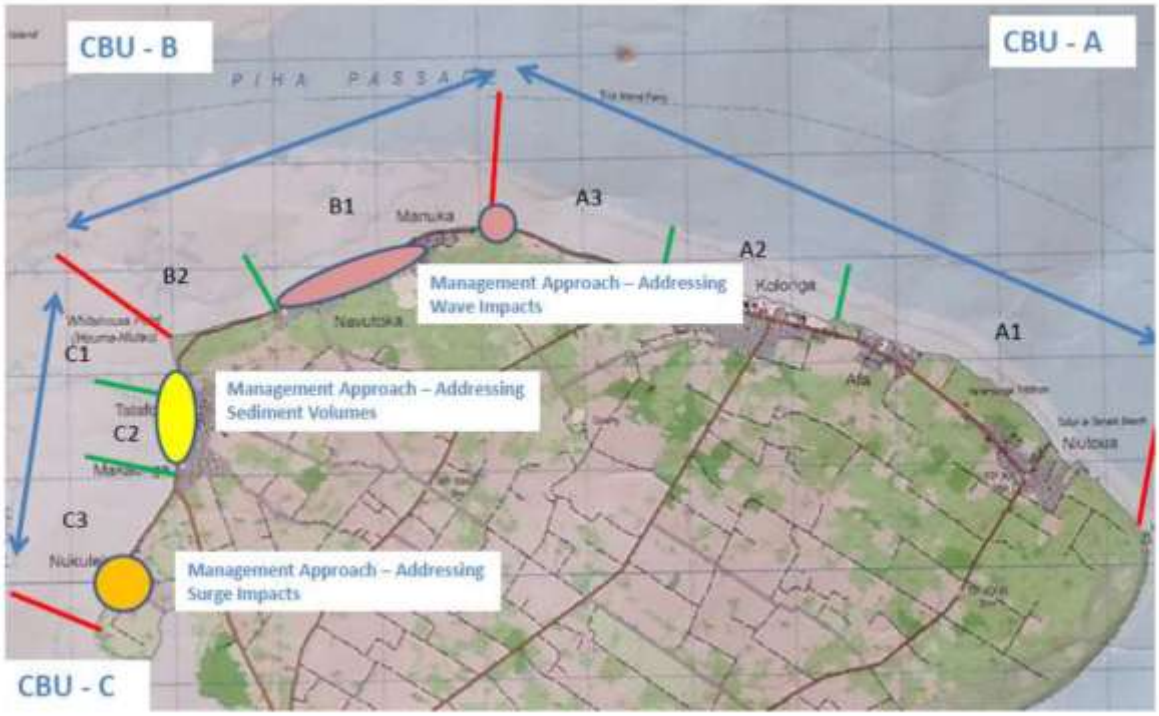

Figure 3 Coastal behavior and management units based on CTL 2012 Report

A consultative workshop was held in December 2012 with GCCA: PSIS project staff and government and community stakeholders in Tonga. Following this workshop an engineering design study was conducted in April-June 2013 by eCoast Marine Consulting and Research. Their terms of reference built on the comprehensive coastal study by the CTL Consultants and the EIA, and called for the detailed design and costing of two coastal protection measures, one based on hard engineering and one using soft engineering methods, and designed to fit within the project budget of €0.5 million.

The eCoast report recommends an approach that is being used in other coastal areas vulnerable to erosion exacerbated by sea level rise: that of “buying time”. The approach recognises that in the long term (over the coming centuries) coastal villages such as in eastern Tongatapu will likely not be habitable due to rising sea levels. Nevertheless there are measures that can be adopted now to alleviate problems resulting from coastal erosion and seawater inundation. The measures to be implemented in this project will “buy time” for the villages in eastern Tongatapu and will also provide lessons and best practices for engineered coastal protection systems for other vulnerable coastal areas in Tonga and elsewhere in the Pacific Islands region.

The eCoast recommendations are for two coastal protection measures each consisting of a blend of hard and soft engineering measures: (i) construction of permeable groynes together with sand recharge and coastal planting in front of Talafo’ou and Makaunga villages; (ii) building small detached breakwaters, combined with sand recharge and coastal (mangrove) planting to the east of Manuka village. The actual measures are further described in Section 3 Project description, under project purpose.

These measures are likely to be successful since they are based on a comprehensive understanding of the dynamics of the coastal area which have involved two different sets of consultants.

An important factor that is being considered during this pilot study is the ADB-funded SPCR project for the same area of Tonga, which is also considering climate change resilience and the trialling and monitoring of coastal protection options. While the SPCR is likely to follow this project by approximately 12 months, the potential benefits include building on and extending the GCCA: PSIS project activities, extending monitoring to 4 years, trialling more options and developing a far better understanding of the existing coastal processes.

The coastal communities have been involved in every step of the project: during the preparation of the JNAP, the 2012 study by the CTL Consultants, the EIA, the project design workshop in December 2012, and a workshop on project design and costing, 20-21 June 2013. In the most recent workshop, whilst they expressed a preference for a seawall they were willing to accept the recommendations of the eCoast consultants.

The project will also support the preparation of a coastal zone management plan for Tongatapu which would include a shoreline protection plan. This will contribute to a comprehensive integrated approach to coastal management.

Related Projects

Tonga has implemented a number climate change related projects since 1998. It has produced the first and second national communication under the UNFCCC and is currently preparing its third national communication. The projects outlined below focus on adaptation in various sectors and provide opportunities for building synergy and to some extent complement climate change adaptation in coastal areas.

1) *Strategic Program for Climate Resilience (ADB)* 2012 (implementing period 2014-2019). This USD20 million programme has three main components: (i) capacity building to support transformation to a climate resilient development path; (ii) sustainable climate change financing; and (iii) building ecosystem resilience and climate proofing critical infrastructure (including coastal protection systems). Collaboration is ongoing with this project since component (iii) will likely include some support for coastal protection measures in eastern Tongatapu.

2) *International Climate Change Adaptation Initiative (ICCAI)* 2008-2013, supported by AUSAID. This multi-faceted project has included improved scientific information and understanding; strategic planning and vulnerability assessments; implementing, financing and coordinating adaptation measures; and multilateral support for climate change adaptation. In Tonga, a specific project delivered through the Pacific Australia Climate Change Science and Adaptation Planning Programme has focused on providing improved information on coastal changes so as to inform management through measures such as coastal setbacks.

3) *Mangrove Ecosystems for Climate Change Adaptation and Livelihoods (MESCAL) project* 2011-2014, supported by the International Union for the Conservation of Nature (IUCN) and funded by the governments of Italy and Austria. This project focuses particularly on community livelihoods and mangrove conservation.

4) *Coping with Climate Change in the Pacific Island Region (CCCPIR)* 2009–2015 German Ministry for Economic Cooperation and Development (BMZ, funding), German International Cooperation (GIZ, implementing agency), SPC (regional partner). In Tonga, CCCPIR focuses on mainstreaming climate change, and integrated land resource management and forestry management. Project activities include climate change education and awareness.

1. PROJECT SELECTION PROCESS

The project selection process involved a number of activities which are listed below in chronological order.

February – May 2012: Review of Background Information

A literature review was conducted of the projects, programmes and activities relating to climate change that were ongoing or recently implemented in the country. Information from the review was compiled into a climate change profile for Tonga now available at http://www.spc.int/en/our-work/climate-change/gcca.html. The document provided a useful background for identification of a focus area for the adaptation project in the Cook Islands.

May 2012: Initial discussions at the GCAA:PSIS Project Steering Committee Meeting

Tonga's adaptation needs and priorities were discussed at the first GCCA: PSIS Project Steering Committee Regional Meeting held from 28-29 May 2012 in Suva, Fiji. At this meeting a specific session was focused on identification of possible focus areas for adaptation and other areas including mainstreaming, national coordination activities, working arrangements and training and/or capacity building needs. Tonga had already identified coastal protection in eastern Tongatapu as their focus area through the JNAP.

June 2012: In-country consultations relating to on-the-ground adaptation project and other activities

A mission was conducted to Tonga in June 2012. The objectives of the mission were to (i) introduce GCCA: PSIS Project in Tonga; (ii) discuss and advance arrangements for signing of the letter of agreement (LoA) and arrangements for national coordination of project's activities; and (iii) discuss and confirm with the stakeholders climate change adaptation focus area and progress the preparation of a climate change adaptation project concept note.

Upon confirmation of the adaptation focus area work started on the preparation of the project concept note.

June-August 2012: Project Concept Development and Approval

A project concept note on "Trialling coastal protection measures in eastern Tongatapu, Tonga" was developed by the (then) Ministry of Environment and Climate Change and submitted to the GCCA: PSIS Project and the EU for approval. The project concept outlined the key implementing agencies and partners, estimated costs, objectives, justification/rationale and how the project fits with key criteria including feasibility, scientific validity, urgency, equity, replication, measurability, and scope and supporting policy documentation. The concept note was approved in August 2012.

September 2012: In-country consultations to advance the design of the on-the-ground adaptation project

A further in-country mission was held to advance the adaptation project and to follow up on arrangements for signing of the LoA by the government of Tonga and SPC. A number of key documents relating to adaptation project were made available during the visit. Tonga had

already conducted a feasibility study on the various coastal protection measures for the project area (i.e. eastern Tongatapu); “Coastal Feasibility Studies, Coastal Design and Costing for the six communities on the eastern side of Tongatapu” and “Environmental Impacts Assessment of the Coastal Protection Measures in eastern Tongatapu.” These two studies and documentation thereof provided the basis for advancing the preparation of the project design document.

December 2012: Project Planning Meeting

A project planning meeting was held on 12-13 December 2012 with 23 participants from government agencies and the town councillors from the affected communities to discuss the overall objective and purpose, key results and activities of the project. The meeting also discussed roles and responsibilities of the various stakeholders, implementation arrangements and monitoring and evaluation. The meeting also developed a draft Project Logical Framework (Logframe) outlining the key elements (objective, purpose, key results and activities). It was agreed that in order to progress further there was a need to recruit marine engineering technical assistance to design and cost a hard and soft coastal protection measure for the affected area, and based on the feasibility study already conducted, that could be funded within the available budget.

January – June 2013: Coastal engineering design and costing

Terms of reference were prepared for a consultancy to prepare the coastal engineering design and costing. A call for expressions of interest was issued and a New Zealand company eCoast Ltd, Marine Consulting and Research, was selected and contracted to provide a design and cost for one soft and one hard coastal protection options. The draft design document was completed in May 2013 and identified and costed two options: (i) permeable groynes and sand recharge along the beach front in front of Talafo’ou and Makaunga Villages; and (ii) and detached breakwaters and sand recharge along the 350m stretch east of Manuka village.

The two coastal protection measures was presented to the stakeholders (government, non-government, local/community representatives) at a Stakeholder and Design Workshop in Nuku’alofa, Tonga, 21-22 June 2013. The objectives of the workshop were to: (i) revise and finalise draft Logframe; (ii) review proposed design and costing of coastal protection measures; (iii) select and agree on the most appropriate coastal protection measures for implementation and (iv) discuss and agree on the budget for the project. The workshop also discussed a monitoring and maintenance plan. The draft design documents will be finalised in July 2013.

2. PROJECT DESCRIPTION

This section outlines the overall objective, purpose and key results as outlined in the project logframe. It also describes how the key results will be implemented, monitored and evaluated over the project life and beyond.

Overall Objective

The overall objective of the project is **"To increase resilience to climate change impacts in Tonga."** The objective is consistent with Tonga's JNAP, and contributes to the JNAP Management Goal 3: Analysis and assessment of vulnerability to climate change impacts and disaster risks; and 4: Enhanced community preparedness and resilience to impacts of all disasters. The project will benefit the 3,367 people living in this area.

The project will implement and evaluate the two coastal protection measures in an area that is already vulnerable to coastal erosion and will provide lessons and/or best practices for coastal protection in other areas of Tongatapu and elsewhere in Tonga and in the Pacific islands region.

Project Purpose

The project purpose is **"To trial coastal protection measures in eastern Tongatapu**". The project will implement and evaluate two different coastal protection measures on sections of a 6 km stretch of low-lying (less than 2m above mean sea level) coast in eastern Tongatapu. The six coastal villages and coastal road in this area are already vulnerable to coastal erosion, the impacts of which will be exacerbated by sea level rise. The coastal engineering approach adopted is one used elsewhere in the world and consists of "Buying time through managed advance". This consists of using specially designed coastal protection measures to prograde the coastline seaward while recognising that the measures will only buy time for a period of possibly decades. It is envisaged that coastal communities will have to consider other options such as relocation in the coming decades.

Each of the selected coastal protection measures consist of a blend of hard and soft engineering measures: (i) construction of permeable groynes together with sand recharge and coastal planting in front of Talafo'ou and Makaunga villages; (ii) building small detached breakwaters, combined with sand recharge and coastal (mangrove) planting to the east of Manuka village. Figure 4 shows a map of the area and the proposed measures.

These options have been identified and costed in the coastal engineering design and endorsed during a participatory workshop with the relevant stakeholders (government, non-government, private sector and local communities/villages).

The project will also engage and enable communities, schools and government to monitor and evaluate coastal changes and protection measures over the term of the project and beyond thereby building local ownership and awareness of the adverse impacts of climate change.

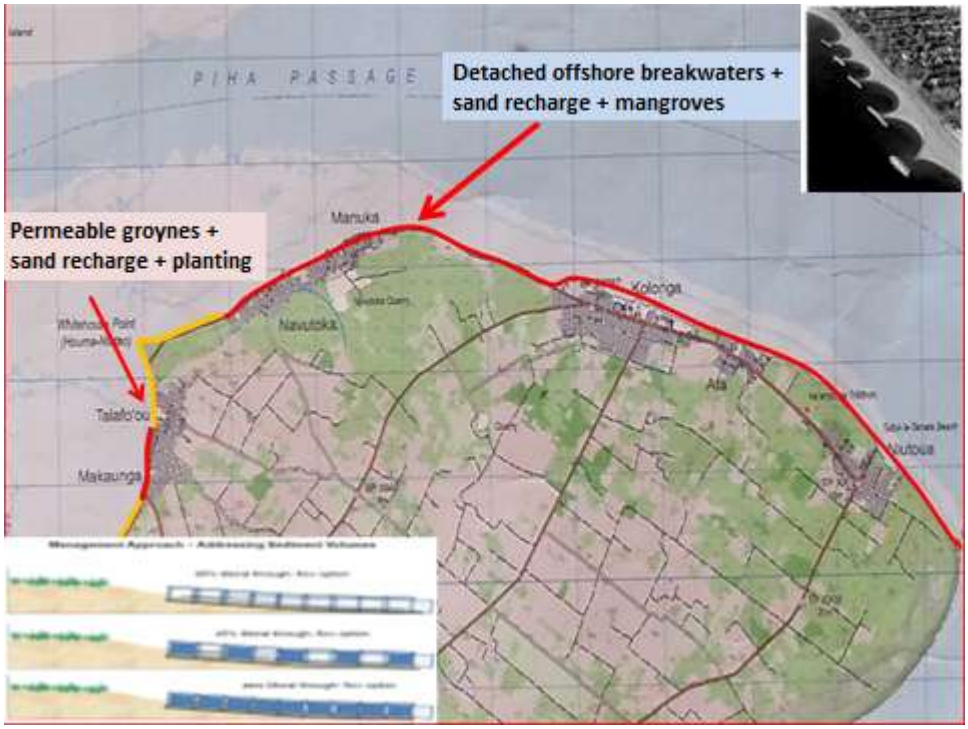

Figure 4 Location of proposed measures in eastern Tongatapu

Existing small permeable groyne which is resulting in some local beach accretion. (The new groynes in this project will be combined with beach nourishment and coastal planting)

Failed sea wall east of Manuka which is now functioning as an offshore breakwater and providing protection from waves so sand accretes behind it. (The project will construct short offshore breakwaters such as this in combination with beach nourishment and mangrove planting.

Key Result Areas and Activities

The key result areas (KRA) identified through a consultative and participatory process for this project are as follows:

KRA1: Education and awareness on coastal management in the context of climate change enhanced in Tonga.

This component will include the following key activities.

1.1 Communications plan – Tonga has already requested assistance from the GCCA: PSIS mainstreaming budget line to prepare a communications plan for increasing the awareness and understanding of the impacts of climate change in Tonga. This plan will also guide the communication and awareness activities to be undertaken as part of this project. Since this has already been accommodated under a different budget line, no further amount is included for this activity in the project budget in section 4.

1.2 Community engagement – This is an important part of the project as it contributes to sustainability. A series of community meetings will be held during project life in order to raise the level of awareness and understanding about coastal management issues and climate change adaptation and to contribute to community ownership. Communities will also be involved in monitoring of the coastal measures.

1.3 Implementation of awareness and education activities - Awareness and education activities will focus on different target groups including communities, local government, schools, youth and church groups. The awareness and education materials will include preparation of information brochures and pamphlets, school programmes that include monitoring and stewardship of the coastal zone (e.g. the Sandwatch programme), radio/television broadcasts, and community billboards in Tongatapu.

KRA2: Coastal adaptation measures involving hard and soft protection elements identified, designed and constructed for a vulnerable coastal community in eastern Tonatapu

This component will involve the following activities:

2.1 Hire one civil engineer who will be based in MLECCNR to (a) assist with preparation of tender documents and tendering process (b) oversee the project on-the-ground pre, during and after construction, and (c) liaise with Ministry of Infrastructure in matters relating to this project – Given the technical and engineering nature of the project, this staff member, preferably a civil engineer, will be positioned at the MLECCNR where they can also assist the Environmental Impact Assessment (EIA) Unit with infrastructural compliance. The Engineer will be expected to liaise closely with the Ministry of Infrastructure staff to ensure standard government procedures are adhered to in the construction and monitoring of the project's coastal protection measures.

2.2 Preparation of a detailed design and costing of at least two coastal protection options for eastern Tongatapu and prepare a monitoring plan – A detailed design and costing of the coastal protection measures will be prepared, discussed, reviewed and agreed by all stakeholders. A coastal engineer (s) will be contracted to provide the design and costing for one hard and one soft option for coastal protection measures for eastern Tongatapu.

This activity was agreed to at the December 2012 workshop. In consultation with the Government of Tonga, specifically the MLECC&NR, an expression of interest (EOI) for a detailed design and costing was issued. A number of EOIs were received and screened for their suitability by a panel comprising personnel from SPC-GCCA: PSIS Project and MLECC&NR. Upon recommendation of the panel, a firm from New Zealand, eCoast Marine Consulting and Research were contracted to carry out this work. The work was completed over the period April-June 2013. This activity was funded under the project's mainstreaming budget so no further amount is included for this activity in the project budget in section 4.

2.3 Engage key stakeholders for the selection of coastal protection measures and sites - Detailed design and costing are provided in the document titled "*Design of Two Coastal Erosion Options for Eastern Tongatapu, Tonga.*" Based on this document which was presented to the stakeholders and discussed at the Stakeholder Design and Costing workshop, 21-22 June 2013, the two most appropriate coastal protection measures identified were (i) permeable groynes, sand re-charge and coastal planting in front of Talafo'ou and Makaunga villages; and (ii) detached offshore breakwaters, sand re-charge and mangrove planting east of Manuka. This activity was funded under the project's consultation and training budget line so no further amount is included for this activity in the project budget in section 4.

2.4 Construct the selected coastal protection measures – This activity will focus on the construction of the engineered coastal protection measures identified. Thus a tender will be issued by the government to contract a firm to construct (i) permeable groynes, sand re-charge and coastal planting in front of Talafo'ou and Makaunga villages; and (ii) detached offshore breakwaters, sand re-charge and mangrove planting east of Manuka. The tendering process will follow the government procurement policy/plan. The engineering specifications for the coastal protection measures are provided in the detailed design and costing document prepared by eConsult Marine Consulting and Research.

KRA3: Effectiveness of the coastal protection measures monitored, in collaboration with other related projects

This activity will involve the following activities.

a. Implement a monitoring program to evaluate the effectiveness of the coastal protection measure and changes along adjacent coastal areas – A monitoring programme has been designed to evaluate the effectiveness of the coastal protection measure. This includes shoreline monitoring and structural integrity monitoring, beach profiles and photographs supported by regular site visit field notes. The monitoring of beach and structures will follow the monitoring and evaluation plan prepared for the project and contained in document titled *"Monitoring and Evaluation Plan for Two Coastal Erosion*

Options for Eastern Tongatapu, Tonga" prepared as part of coastal design and costing study. The ADB-funded Strategic Program for Climate Resilience, which will build on this project in eastern Tongatapu, and which starts in 2014, will likely be able to continue the monitoring beyond the life of this GCCA: PSIS intervention. Thus close collaboration with the Strategic program for Climate Resilience is ongoing. The monitoring will be undertaken by the Geology Division of the MLECC&NR and will include community and school involvement (see also 3.3).

b. Assess performance of structures and adjust as required – Following the ongoing performance assessment during the first year, at the end of the first 12 months a full assessment will be conducted. Depending on the results of this 12-month assessment, it may be necessary to make some small adjustments to the structures. Funding has been set aside in the budget for such adjustments. An outside coastal engineering contractor will be hired for this assessment.

3.3 Hold training workshops in the monitoring and maintenance of coastal foreshore protection measures for (i) government and (ii) communities – To support the implementation of the project, monitoring and evaluation of the coastal protection measures a number of training workshops will be held to train personnel from relevant government agencies and communities to monitor and maintain foreshore protection measures and contribute to sound coastal management. The training will be extended to schools in the area, using existing programmes such as Sandwatch that include monitoring and stewardship of the coastal zone.

KRA4: Capacity of key stakeholders in Tonga enhanced to plan for coastal change in the context of climate variability and change.

The key activities for KRA4 are the following:

4.1 Prepare a Diagnostic Study and Integrated Coastal Management Plan for Tongatapu - this will address coastal changes, including those resulting from climate change especially sea level rise, up to 2050. The coastal protection project in eastern Tongatapu will be complemented by the integrated coastal management plan. Furthermore the future implementation of the integrated coastal management plan will help Tonga move from a piecemeal approach to coastal issues to a comprehensive planned approach that also accommodates future climate change including sea level rise. The terms of reference for the preparation of the ICZM plan have been prepared and consist of two phases: a diagnostic study, followed by preparation of the plan. An expression of interest will be issued in quarter 3 of 2013. This work will run in parallel with the implementation of the coastal protection measures. This preparation of the diagnostic study and the integrated coastal management plan for Tongatapu will be funded under the project's mainstreaming budget so no further amount is included for this activity in the project budget in section 4.

SPC-GCCA: PSIS Project will issue a call for expressions of interest (EOI) from interested parties to bid for the contract to undertake this work. Once the EOIs are received they will be assessed by a panel comprising a representative from the Government of Tonga and SPC-GCCA: PSIS Project. The TA for the preparation of ICZM will be supported by the SPC-GCCA: PSIS Project National Coordinator.

4.2 Hold a series of meetings with communities and key stakeholders to publicise the plan, obtain input and finalise the plan – As part of the preparation of integrated coastal management plan for Tongatapu, a series of meetings with communities and key stakeholders will be held on Tongatapu to provide input to the plan. Results of the consultations and meetings held in the project area during the implementation of the coastal protection project will be included in the integrated coastal management plan.

The project log frame is presented below.

Project Log Frame

Trialling Coastal Protection Measures in eastern Tongatapu, Tonga			
Description	**Verifiable Indicators**	**Verification Sources**	**Assumptions**
Overall Objective: Increase resilience to climate change impacts in Tonga.	• Level of awareness about climate change adaptation and coastal management raised by 06/2015* for 10% of population of Tongatapu. • Climate change adaptation /disaster risk reduction measures incorporated into the integrated coastal management plan by 06/2015*	• Annual reports, work plans, budgets for Tonga Government agencies • JNAP review and planning • Climate Change Policy • Project reports • Integrated coastal management plan and related documents • Questionnaire surveys	.
Purpose: Trial coastal protection measures in eastern Tongatapu.	• Lessons learnt from these coastal protection interventions shared and applied to implementation of SPCR project by 06/2015 • At least six communities provide input (written or verbal) to the integrated coastal management plan by 03/2015	• Annual reports, work plans, budgets for Tonga Government agencies • Project reports • SPCR reports • Integrated coastal management plan and documents related to its preparation • Coastal monitoring reports	• Communities receptive to information and willing to take proactive action • Basic logistics: materials, transport available within project timeframe • Delivery and installation not affected by an extreme weather event or natural hazard e.g. cyclone, tsunami
Key Result Area 1 Education and awareness on coastal management in the context of climate change enhanced in Tonga.	• Communications plan and schedule of education and awareness activities prepared by 06/2014. • At least four education and awareness activities conducted by 12/2014.	• Annual reports, work plans, budgets for Tonga Government agencies • Communication plan • Project Progress Reports • Public awareness materials	• Schools receptive to taking on board educational material

Trialling Coastal Protection Measures in eastern Tongatapu, Tonga			
Description	**Verifiable Indicators**	**Verification Sources**	**Assumptions**
Key Results Area 2 Coastal adaptation measure involving hard and soft protection elements identified, designed and constructed for a vulnerable coastal community in eastern Tongatapu.	• Coastal protection measures selected, designed and costed by 09/2013 • One coastal protection measure completed and in place by 09/2014	• Approved Project Design Document • Job description project coordinator/engineer • Consultant's Report (eCoast) • Stakeholder workshop report • Tender Documents • Implementation plan	• Communities support the selected adaptation measures • Suitable staff available for timely recruitment.
Key Result Area 3 Effectiveness of the coastal protection measures monitored, in collaboration with other related projects.	• At least 5 staff in MLECC&NR regularly engaged in beach monitoring by 12/2014 • At least two schools involved in coastal monitoring by 03/2015	• Annual reports, work plans, budgets for Tonga Government agencies • Project reports • Maintenance plan • Monitoring reports	• Community and relevant government agencies willing to adopt monitoring and maintenance activities
Key Result Area 4 Capacity of key stakeholders in Tonga enhanced to plan for coastal change in the context of climate variability and change	• Integrated coastal management plan prepared by 03/2015	• Annual reports, work plans, budgets for Tonga Government agencies • Project reports • Integrated coastal management plan and supporting documents	• Consultant available to undertake the plan preparation • Buy-in from communities and government
<u>Activities</u> 1.1 Develop a communications plan to schedule delivery of education and awareness activities during the project. 1.2 Engage communities in eastern Tongatapu through a series of meetings during project life and raise level of understanding about	<u>Means</u> Technical assistance Information sharing systems Missions to countries Meetings and consultations Training activities Procurement of equipment and transportation	<u>Indicative costs</u> Indicative cost €0.5 million	

Trialling Coastal Protection Measures in eastern Tongatapu, Tonga			
Description	**Verifiable Indicators**	**Verification Sources**	**Assumptions**
coastal management and climate change adaptation. 1.3 Implement at least six different awareness and education activities relating to coastal management and climate change adaptation e.g. brochures, school activities, community billboards in Tongatapu. 1.4 Engage communities and key stakeholders to publicise the coastal management plan, obtain input and finalise the coastal management plan. 2.1 Hire one civil engineer who will be based in MLECCNR to (a) assist with tendering for the project; (b) oversee the project, and (c) liaise with MOI 2.2 Prepare detailed design and costing of at least two coastal protection options for eastern Tongatapu and prepare a monitoring plan. 2.3 Engage key stakeholders for the selection of coastal protection measures and sites. 2.4 Construct the selected coastal protection measure 3.1 Implement a monitoring program	Media involvement Reporting and evaluation		

Trialling Coastal Protection Measures in eastern Tongatapu, Tonga			
Description	**Verifiable Indicators**	**Verification Sources**	**Assumptions**
to evaluate the effectiveness of the coastal protection measures and changes along adjacent coastal areas. 3.2 Assess performance of structures and adjust as required. 3.3 Hold training workshops in the monitoring and maintenance of coastal foreshore protection measures for (i) government and (ii) communities 4.1 Prepare a Diagnostic Study and Integrated Coastal Management Plan for Tongatapu that will address coastal changes, including those resulting from climate change, up to 2050.			

*The project finishes in November 2014, however SPC is requesting an extension of the project.

4 PROJECT BUDGET AND PAYMENT SCHEDULE

Budget

Activity	Budget item	KRA Total
	(USD)	USD
KRA 1 Education and awareness on coastal management in the context of climate change enhanced in Tonga.		21,000
KRA 2 Coastal adaptation measures involving hard and soft protection elements identified, designed and constructed for a vulnerable coastal community.		534,100
KRA 3 Effectiveness of the coastal protection measures monitored, in collaboration with other related projects		101,000
KRA 4 Capacity of key stakeholders in Tonga enhanced to plan for coastal change in the context of climate variability and change		
Total	656,100	656,100

A 10% contingency was built into the cost of the coastal protection measures at the design stage, so no further contingency has been built into the overall project budget.

The first payment of the Tonga Pa'anga equivalent of USD 44,000 will be paid once this Project Design Document is signed by all parties. Payments shall be made into the Government's account. All payments will be made in the currency of the Government of Tonga. The second payment can be requested once 80% of the first payment has been fully acquitted. Acquittals must be supported by receipts. Annual government audits will be sufficient unless any accounting or financial problems emerge. Any interest accruing from the advances paid by SPC shall be considered as income for the purpose of operating this project. It may be used to cover eligible costs of the operation.

Quarterly financial reporting is required and a specific template for Tonga will be developed once the Project Design Document is signed.

The Government shall oversee accurate and regular records and accounts of the implementation of the operation.

- Financial transactions and financial statements shall be subject to the internal and external-auditing procedures laid down in the financial regulations, rules and directives of SPC.

- All original substantiating documents relating to each financial transaction shall form part of the monthly acquittal.

- Reimbursements of funds shall only be made on receipt of the proper acquittal of the funds already advanced.

- Fixed assets (equipment): All fixed assets (equipment) will remain the property of SPC until the closure of the project. On closure of the project the assets will be officially handed over by SPC to the respective stakeholders in the country. An asset register of all assets purchased should be kept in the office of the Government.

5. PROJECT SCHEDULE

Key Result Areas/Activities	2013				2014				2015	
	1Q Jan	2Q April	3Q July	4Q Oct	1Q Jan	2Q April	3Q July	4Q Oct	1Q Jan	Q2 April
KRA1. **Education and awareness on coastal management in the context of climate change enhanced in Tonga**										
1.1. Develop a communications plan										
1.2. Community engagement										
1.3. Implementation of education and awareness activities										
1.4 Hold a series of meetings with communities and key stakeholders to publicise the coastal management plan, obtain input and finalise the plan										
KRA2. **At least one coastal adaptation measure involving hard and soft protection elements identified, designed and constructed for a vulnerable coastal community.**										
2.1 Hire one civil engineer who will be based in MLECCNR to oversee the tender and implementation of the project and liaise with MOI										
2.2. Preparation of a detailed design and costing of coastal protection measures and monitoring plan										
2.3. Hold meetings with key stakeholders to select coastal protection measures and sites										
2.4. Construct the selected coastal protection measures										
KRA3. **Effectiveness of the coastal protection measures monitored, in collaboration with other related projects.**										
3.1. Implement monitoring programme to evaluate effectiveness of the coastal protection measures and changes along adjacent coastal areas										

Key Result Areas/Activities	2013				2014				2015	
	1Q Jan	2Q April	3Q July	4Q Oct	1Q Jan	2Q April	3Q July	4Q Oct	1Q Jan	Q2 April
3.2. Assess performance of structures and adjust as required										
3.3. Hold training workshops in monitoring and maintenance of foreshore protection measures for (a) government and (b) communities										
KRA4. **Capacity of key stakeholders in Tonga enhanced to plan for coastal change in the context of climate variability and change.**										
4.1. Prepare a Diagnostic Study and Integrated Coastal Management plan for Tongatapu that will address coastal changes, including those resulting from climate change, up to 2050.										

6. INSTITUTIONAL ARRANGEMENTS

The project will be implemented and managed by MLECCNR in partnership with the Ministry of Infrastructure. The GCCA: PSIS project is being implemented under the ambit of the Letter of Agreement signed on 9th January 2013 by SPC and the Government of Tonga. The Tongan signatories to the Letter of Agreement are the Director Ministry of Environment and Climate Change and the Secretary, Ministry of Finance and National Planning.

Project Oversight Committee

The National Environmental Coordinating Committee (NECC) will provide oversight to the project implementation. NECC will also provide guidance on policy and technical issues relating to the implementation of the project. The SPC-GCCA: PSIS Project Coordinator will provide secretariat services to the NECC on this project

Reporting

The GCCA: PSIS National Coordinator and the Civil Engineer both based at MLECCNR will be responsible for overseeing the implementation of project activities and providing quarterly narrative and financial progress reports to the Oversight Committee. A template for the quarterly report is presented as Annex 1.

Day to Day Implementation of the project

The Civil Engineer and the GCCA: PSIS National Coordinator both based at MLECCNR will work closely with the Ministry of Infrastructure to implement and manage the project activities.

7 RISK MANAGEMENT AND EXIT STRATEGY

Risk Management

The project risks and ways to manage them are listed in the table below.

Risk and consequence	Likelihood	Seriousness (Impact)	Mitigation actions	Responsible Person
1. Natural hazards				
Natural hazards such as tropical cyclones, extreme rainfall events and tsunamis could dramatically damage the coast/delay construction/ shift project focus away from implementation to other emergency response activities.	Medium	Medium	Schedule construction works outside of the cyclone season Sound early warning system	MOI, MLECCNR Tonga Meteorological Service
2. Availability of materials				
Unavailability of materials for construction	Low	Low	Project designed to utilise materials that can be made locally e.g. sedi-tunnel units	Consultants involved in design
3. **Funding for maintenance**				
Inadequate maintenance of structures will lead to failure	Medium	Medium	Maintenance plan designed and implemented Funds set aside for maintenance and adjustment in project budget Monitoring of structures continued beyond project life by MOI and related projects such as SPCR	Consultants involved in design GCCA: PSIS, MLECCNR MLECCNR, MOI, SPCR
4. Lack of stakeholder involvement				
Unclear division of roles between government agencies and climate change projects	Medium	Medium	Ensure existing committees take on oversight role Close collaboration with other projects e.g. SPCR	MLECCNR MLECCNR, MOI, SPCR

Risk and consequence	Likelihood	Seriousness (Impact)	Mitigation actions	Responsible Person
Insufficient involvement of local communities	Low	Medium	All stakeholders and Local communities involved in project planning and design Local communities and schools to be included in coastal monitoring Full involvement of coastal communities in coastal management plan	MLECCNR MLECCNR MLECCNR
5. Overlap with other climate change activities				
Inefficient use of resources resulting in duplication of effort	Low	Medium	Continuous collaboration with partners and sound project design Ensure project activities and results are shared widely with climate change funding partners	All Donors, SPC

Exit Strategy

The overall design of this project which has attempted to move from a piecemeal approach to a more comprehensive framework by looking at an entire geomorphological section of coastline and understanding the processes and coastal dynamics, provides a good example for the MLECCNR and the Ministry of Infrastructure to use in the future. This should lead the way to replace the short time reactive approach with a longer term, planned and proactive approach.

This is further enhanced by the development of the coastal management plan for Tongatapu which will provide clear guidance for the long term planning of the coastal area for Tongatapu and will also incorporate long term climate change especially sea level rise.

Coastal communities in eastern Tongatapu, as in other small islands, are very adamant that their best possible protection is a solid seawall. Experience has shown that this is often not the case, and this project will provide an opportunity for communities to see and learn about other options and how they perform.

The SPCR which continues beyond this current GCCA: PSIS project will provide an opportunity for longer term monitoring of the performance of the coastal protection measures and possibly also duplication of the project measures, if successful.

Annex 1 Quarterly Reporting Template

Activities	Progress in Quarter X	Planned Activities in Quarter X+1
Key Result Area 1: Education and awareness on coastal management in the context of climate change enhanced in Tonga		
1.1Develop a communication plan	•	•
1.2 Community engagement	•	•
1.3 Implementation of education and awareness activities	•	•
1.4 Hold a series of meetings with communities and key stakeholders to publicise the plan, obtain input and finalise the plan.	•	•
Key Result Area 2: At least one coastal adaptation measure involving hard and soft protection elements identified, designed and constructed for a vulnerable coastal community in eastern Tongatapu		
2.1 Hiring of a civil engineer based in MLECCNR to oversee the tender and implementation of the project and liaise with MoI	•	
2.2 Preparation of a detailed design and costing of coastal protection measures and monitoring plan	• Completed	• Completed, no further action required
2.3. Engage key stakeholders to select coastal protection measures and sites	• Completed	• Completed, no further action required
2.4 Construct the selected coastal protection measures.	•	
Key Result Area 3: Effectiveness of the coastal protection measures monitored in collaboration with other related projects.		
3.1 Implement monitoring programme to evaluate effectiveness of the coastal protection measures and changes along adjacent coastal areas.	•	
3.2 Assess performance of structures and adjust as required.	•	

Activities	Progress in Quarter X	Planned Activities in Quarter X+1
3.3. Hold training workshops in monitoring and maintenance of foreshore protection measures for (a) government and (b) communities.	•	
Key Result Area 4: Capacity of key stakeholders in Tonga enhanced to plan for coastal change in the context of climate variability and change.		
4.1 Prepare a Diagnostic Study and Integrated Coastal Management plan for Tongatapu that will address coastal changes, including those resulting from climate change, up to 2050.	•	