REPUBLIC OF KIRIBATI

NATIONAL ADAPTATION PROGRAM OF ACTION (NAPA)

ENVIRONMENT AND CONSERVATION DIVISION,
MINISTRY OF ENVIRONMENT, LAND, AND AGRICULTURAL DEVELOPMENT
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Preface

Kiribati is one of the most vulnerable countries to the adverse impacts of climate change. The atolls of Kiribati rise 3-4 metres above mean sea level and are an average of a few hundred metres wide. These atolls are the home of nearly 90,000 Kiribati people with their distinct culture. Inundation and erosion destroy key areas of land, and storm surges contaminate the fresh groundwater lens which is vital for survival. An economic evaluation of the costs of climate change related risks has been estimated to be 35% of Kiribati GDP. The estimate takes into account only the potential impacts of climate change on coastal zone (US$7-$13 million a year) and water resources (US$1-$3 million a year). In 1998 the GDP was US$47 million (WB,2000).

The United Nations Framework Convention on Climate Change entered into force as an international agreement on March 1994 and entered into force specifically for Kiribati in May 1995. The Convention sets out blueprints for the common but differentiated responsibilities of parties to address the global concern of climate change. The cause of climate change is largely blamed on past emissions of greenhouse gases by industrialized countries, and these countries have acknowledged their leadership role in responding to climate change. In line with this leadership role, industrialized countries are assisting adaptation measures in countries that are considered most vulnerable to adverse impacts of climate change.

Least developed countries (LDCs) and Small Island Developing States are among the countries that are considered most vulnerable to climate change. They are so, because in the case of the former their special circumstances make them unable to meet the costs of adaptation, and the latter because of their physical susceptibility to the effects of climate change. Kiribati is in both of these groups.

National Adaptation Programmes of Action (NAPA) is an approach to enable LDCs to communicate their immediate and urgent needs for adaptation to the Conference of the Parties. The process involved in the development of the NAPA is designed to ensure the principles of stakeholder participation, country driven-ness, multidisciplinary input, complementarity to other projects, and cost effectiveness.

Concurrent with the NAPA, which has been implemented through the United Nations Development Programme, is the Kiribati Adaptation Project (KAP), initiated by the World Bank. The Kiribati government is equally committed to both projects. Separate management and accountability for each project is maintained whilst coordination, collaboration, and harmonizing of activities of the projects has been achieved. This has been done by adopting a single structure for overseeing adaptation activities in the form of a multidisciplinary technical team reporting to a steering committee consisting of senior level government and NGO officials.

The experience of implementing the two projects on adaptation gave rise to the need to have a policy statement and a strategy on adaptation. This policy statement stresses that Kiribati needs to be prepared for adaptation, piloting small scale adaptation projects, and

collecting data useful for designing adaptation measures that achieve climate proofing aims. NAPA is consistent with this policy and intends to make visible adaptation efforts through undertaking work on upgrading and protection of essential physical assets that are increasingly being exposed to risks of climate change impacts, particularly from droughts, storm surges, storm variability and sea level rise.

The process of the NAPA preparation included national consultations, CCST's work, and some external review on technical information. Kiribati is particularly grateful for very constructive comments from the LEG following their review of the NAPA Draft at our request.

These comments guided further work on the NAPA Draft which on completion enabled the CCST and the NASC to present to Cabinet in September 2006 a final version. This version, as it is, was endorsed by Cabinet at its meeting on the 10th January 2007. This document seeks financial assistance to follow through with the firm foundation for action established by the NAPA process.

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Tarawa, Kiribati
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Attachment I. Complementary Table on NAPA and KAP II

Acronyms

AU$	Australian dollars
AG Chambers	Attorney General's Chambers
ATFTG	Australian Tidal Facility Tide Gauge
BP	Before the present
CBD	Convention on Biological Diversity
CCA	Climate Change Adaptation
CCAS	Climate Change Adaptation Strategy
CCD	Convention to Combat Desertification
CCST	Climate Change Study Team
CHARM	Comprehensive Hazard and Risk Management
COP	Conference of the Parties
ECD	Environment and Conservation Division
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessments
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GIS	Global Information System
GOK	Government of Kiribati
IPCC	Intergovernmental Panel on Climate Change
KAP	Kiribati Adaptation Project
KHC	Kiribati Housing Corporation
LDC	Least Developed Country
LEG	Least Developed Countries Experts Group
LMOs	Living Modified Organisms
MCTTD	Ministry of Communication, Transport and Tourism Development
MDGs	Millennium Development Goals
MEA	Multilateral Environmental Agreement
MELAD	Ministry of Environment, Lands and Agriculture Development
MEYS	Ministry of Education, Youth, and Sport
MFAI	Ministry of Foreign Affairs and Immigration
MFED	Ministry of Finance and Economic Development

MFMRD	Ministry of Fisheries and Marine Resources Development
MHMS	Ministry of Health and Medical Services
MISA	Ministry of Internal and Social Affairs
MOPs	Ministry Operational Plans
MPWU	Ministry of Public Works and Utilities
NAPA	National Adaptation Programs of Action
NASC	National Adaptation Steering Committee
NBSAP	National Biodiversity Strategy and Action Plan
NDS	National Development Strategy
NEPO	National Economic Planning Office
OB	Office of Te Beretitenti
PMO	Project Management Office
PUB	Public Utilities Board
TSKL	Telecommunication Service Kiribati Limited
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
WB	World Bank
WEU	Water Engineering Unit
WHO	World Health Organization

EXECUTIVE SUMMARY

This document sets out a 3 year plan for urgent and immediate actions in the Republic of Kiribati to begin work in adapting to climate change. These actions forming the project profiles are developed through the NAPA process.

Kiribati is situated in the Central Pacific Ocean and consists of 33 atolls with a total land area of about 800 sq km. The atolls have a maximum height of 3 to 4 m above mean sea level and support an estimated population in 2005 of about 95,000 people. Most people live a subsistence lifestyle.

In 1979 Kiribati gained independence and is now a democratic republic state under its own constitution. Kiribati is politically stable.

In 2000 only 9200 people of 84494 were employed - about 66% in finance services and public administration sectors. Per capita GDP is quite low by international standard, and there is a concern about financial sustainability given that the gap between import and export continues to widen.

Kiribati has a National Development Strategy for 2004-2007, ministry operational plans for each ministry, and a single year budget. Adaptation activities will be managed within the framework created by these documents. The Kiribati government has also approved a Climate Change Adaptation Policy and Strategy. All of these documents have been considered in preparing this National Adaptation Programs of Action (NAPA).

This project, the NAPA, has been implemented concurrently with the Kiribati Adaptation Project (KAP I). Both projects share the same co-coordinating bodies. The Kiribati Adaptation Project focuses on long term planning for adaptation while the NAPA focuses on urgent and immediate needs.

Environmental issues and problems that have been identified as part of this project include:

- emerging “unacceptable level of inequity” (2004-2007NDS p.28);
- increasing population;
- deteriorating states of coastal zones, coral reefs, fisheries, fresh ground water, health and biodiversity;
- inadequate urban services such as water supply and sanitation;
- overexploitation of natural resources in urban Tarawa; and
- difficultly in enforcing land use management strategies and controls.

With warmer temperatures, sea level rise, increased storm surges, climate variability and the increase of associated adverse effects such as erosion, past adaptation practices in Kiribati are no longer found to be effective.

Through national consultations and participatory meetings, key problems were identified. Prioritized adaptation projects for a three year period were developed:

Project	Indicative costs AU$	Local annual budget AU$	Total NAPA costs	Priority ranking
Water Resource Adaptation Project	2,174,500	993,905	3,168,405	1
Simple well improvement	146,000	190,470	336,470	1
Coastal Zone Management for Adaptation	1,312,910	624,370	1,937,280	2
Strengthening Climate Change Information and Monitoring	227,000	90,410	317,410	3
Project Management Institutional Strengthening for NAPA	234,000	85,440	319,440	4
Upgrading of Meteorological Services	150,000	342,310	492,310	5
Agricultural Food Crops Development	450,000	1,105,230	1,555,230	6
Coral Monitoring, Restoration and Stock Enhancement	499,000	87,750	586,750	7
Upgrading of coastal defenses and causeways	5,102,870	567,880	5,670,750	8
Enabling Kiribati effective participation at regional and international forums on climate change.	60,000	45,000	105,000	9
Total	**10,356,280**	**4,090,145**	**14,489,045**	
Add contingency 10% **Grand total for aid funding supported NAPA** **Or US$11,983,420 at 1.33**			**1,448,904** **15,937,950**	

The total cost is about US$12 millions. However, in order to meet GEF sliding scale criteria, the first request for NAPA funding is for **US$ 5,849,450**. The details are provided in Table 4 below.

Chapter 1. Background and setting

1.1 Introduction

This NAPA document has 7 sections. This first section gives the background of the NAPA project and Kiribati setting. The second section deals with general environmental stress symptoms that have been noted, in particular the conditions and processes of key sectors demonstrating their vulnerability to climate change. Section 3 sets out a Framework of Adaptation starting with simple trend analysis of climatic parameters followed by scenarios of climate change and sea level rise. This data forms the rationale for adaptation planning, mainstreaming, and linkages of NAPA with other environmental protection projects.

Section 4 deals with identification of adaptation needs. It is observed that climate related hazards are being exacerbated and that traditional coping strategies are becoming ineffective. It describes how the projects were identified. It also contains information on KAP II to show how KAP II is complementary to the NAPA project.

Section 5 describes the prioritization process aiding the identification of the project profiles submitted in this NAPA document. Section 6 sets out the project profiles using a standard format. Section 7 summarizes the NAPA process that has been followed to get approval of the NAPA document, at both the stakeholder and Cabinet levels.

1.2 International rationales and supports for the NAPA

The UNFCCC entered into force as an international agreement on March 1994 and entered into force for Kiribati in May 1995. Discussions on the implementation of Art.4.9 of the Convention pertaining to the special needs of least developed countries for funding and technology transfer started late in the COP process. At 4th COP serious consideration was given to the issue and 3 years later at COP7, the concept of the NAPA emerged. However, final operational guidelines on the LDC Funds were only adopted at COP9 in 2003. The Kiribati NAPA process was started in mid 2004 after completion of the project brief and receipt of funds for the project.

1.3 Goals and objectives of NAPA

The goal of the NAPA is to contribute to and periodically complement a long term framework of adaptation through identifying immediate and urgent adaptation needs that are consistent with national development strategies and climate change adaptation policies and strategies.

The objective is to communicate in a simplified way the identified immediate and urgent adaptation needs of Kiribati, which is also relevant to the national communication

obligation required by the UNFCCC. These adaptation needs are identified through a participatory, consultative and multidisciplinary planning process.

1.4 Kiribati setting

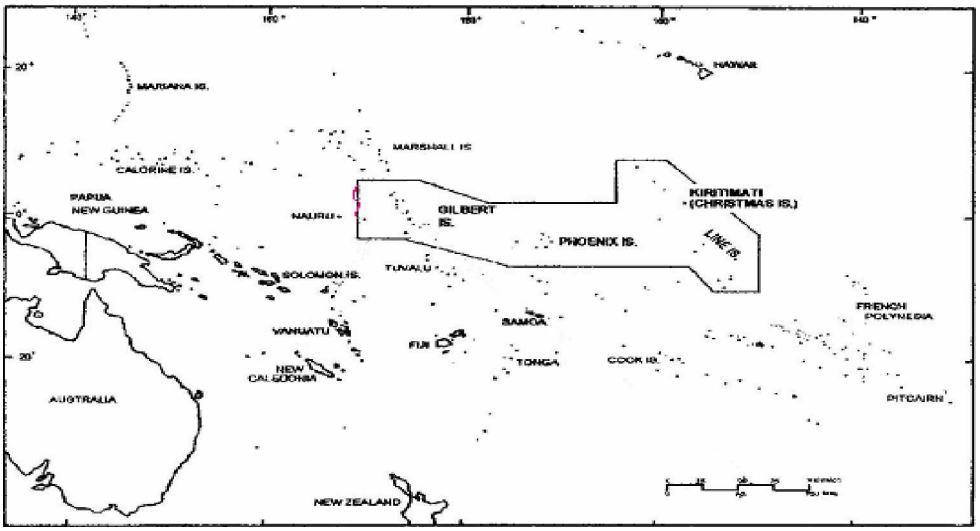

Fig.1: Kiribati in the Central Pacific Basin (State of the Environment Report, 2000-2002)

1.4.1 Geography and environment

Kiribati is situated in the Central Pacific Ocean and consists of 33 atolls with a total land area of about 800 sq km. The atolls exist in three separate groups – the Gilberts, Line and Phoenix. Each group has a separate Exclusive Economic Zone, with the total EEZ for Kiribati being around 3.5 million sq km. The atolls have a maximum height of 3 to 4 m above mean sea level.

Not all of the atolls are inhabited, and some are not capable of being inhabited. The total population of Kiribati during the 2000 census was 84494 and grew during the preceding 5 years at an annual growth rate of 1.7%. For the great majority, the livelihood is at the subsistence level, dependent heavily on natural environment resources. Monetized socio-economic systems are predominating in urban Tarawa and on Kiritimati island, but there is strong interdependency between these systems and that of the quality of the state of the environment.

Subsistence and sustainable means of livelihood are based on indigenous tree crops, namely coconut tree, pandanus tree, bwabwai (giant taro), breadfruit and banana. The productivity of these tree crops is dependent on a healthy environment. The coconut tree produces the important export product, copra; the pandanus tree bears fruits which are traditionally preserved for consumption especially during drought years; bwabwai is a prestigious crop; breadfruit and banana are the only fruit trees that provide varied diet from the mainstay of coconut, bwabwai, and fish.

Larger atolls contain a fresh groundwater lens which 'floats' on seawater. The quality and depth of the groundwater lens varies within an atoll, and affects the agricultural productivity of crops, particularly bwabwai plantations. For most people the groundwater lens is the only source of potable water. Recharge to the groundwater lens is from precipitation of about 2350 mm per year, with the Northern Gilbert and Line Islands being wetter than the Southern Gilbert. Risks to the land resource based livelihood of the people are from droughts, inundation of land from storm surges, salt water intrusion to water lenses, and excessive rainfall creating runoff into drinking groundwater wells.

Global temperature increase affects coral growth and sea level. It is known that the heat content of the oceans has increased, and this could mean increase in internal energy (turbidity enhancement) of the oceans and/or increase in sea level. In Kiribati, coastal erosion, sea water from storm surges inundating the land, extensive sea spray, and coral bleaching are being observed - quite consistent with what to expect from climate change. These changes are adversely affecting the people's livelihood.

Tuna resources are seasonal but are abundant within Kiribati EEZ during El Niño. Kiribati could loose out if climate change causes the tuna fisheries to migrate further to the north. Inshore fisheries are also known to be less productive during drought conditions, normally associated with the La Nina.

1.4.2 Political system and climate change

Fig.2: Kiribati Parliament on an artificial island, higher than surrounding land (State of the Environment Report 2000-2002)

Gaining independence in 1979, Kiribati is a democratic republic state under its own constitution. The constitution provides to all adults the right to elect, from their atolls or electoral districts, members of Parliament for a four year term. The Head of State and the Head of Government is "Te Beretitenti" (the president), elected nationally from among presidential candidates nominated by elected members of Parliament. Te Beretitenti

appoints Cabinet Ministers and assigns them ministerial portfolios. Kiribati is politically stable.

The current Parliament has adopted a National Development Strategy 2004-2007 which recognizes potentially costly risks from climate change affecting economic growth. Government has also adopted a Climate Change Adaptation Policy and Strategy that has the following objectives:

[a] Kiribati should be mentally, physically and financially well prepared to deal with whatever climatic trends and events the future may hold;
[b] this should be achieved through a nationally co-ordinated, participation-based adaptation programme carried out by official and private agencies; and
[c] external financial assistance should be obtained to meet the costs of the national adaptation programme.

This NAPA document is consistent with the NDS 2004-2007 and the CCA Policy objectives.

1.4.3 Socio-economic circumstances

Fig.3: Population increase, urbanization and waste management challenges

In the 1930s, population increases led to great pressure on subsistence livelihood. This in turn led to the resettling of families from the Southern Gilberts on three uninhabited islands of the Phoenix Group.

Droughts of the late 1950s and early 1960s showed that the Phoenix islands were not suitable for permanent settlement. Inhabitants had to be resettled in a foreign country because water was seriously salinized. Normally, droughts are also associated with spread of some fatal diseases.

Population boom after the war would have been obscured by high death rates that occurred during those drought years. Within the period from 1973 to 2000, the annual rates of population increase for different five-year census intervals have fluctuated between 2.3 and 1.4 percent per annum. Kiribati has population policies to encourage responsible family planning but these policies are yet to have a substantive effect.

The NDS 2004-2007 notes these issues: increasing population; growing modernization and urbanization; decline in rural productivity; and unacceptable emerging inequity.

Over the period from 2000 to 2002 GDP grew at an annual rate of 1.4% compared to a population annual growth rate of 1.7%. In 2002 the estimated GDP is AUD$98m. However, GNP is double the level of GDP, reflecting large income from abroad, including official grant and loans. These grants and loans provide part of the (overall) annual government budget, thus underscoring a concern about the sustainability of this level of GDP. A weakened fiscal sustainability is a recognized issue for "economic growth" as pointed out in the NDS 2004-2007.

The level of employment according to the 2000 census is quite low with only 9200 of the 84494 people being employed - about 66% in finance, services, and public administration sectors, and only 3% in the primary sector of fisheries, agricultural and mining. These figures suggest a high level of unemployment and population stress on environmental resources.

Kiribati will continue to depend on assistance from abroad for socio economic development. This dependency is likely to increase into the foreseeable future because of the additional need of protection from climate variability and climate change and the adverse affects on key infrastructure and environmental resources.

Fig.4. What is for now… and for the future!

1.4.4 National Planning Framework and Adaptation

The national planning and budgetary framework consists of 3 interrelated components: the NDS, the MOPs, and the budget. The 2004-2007 NDS sets out what government intends to achieve over the plan period, indicates development issues and strategies which, along with recurrent services and goods, are budgeted in a single year budget framework, based on the past year ministries budget. Based on the issues and strategies, specific outputs are described in the annual operation plans of ministries, guiding their work and enabling the monitoring of progress. Adaptation activities will be managed according to this framework.

The KAP, which addressed strategic longer term adaptation needs, and the NAPA, which addressed urgent and immediate adaptation needs, were implemented at the same time and the outputs of both projects were harmonized. A single structure for overseeing and implementing the two projects has been adopted to ensure that the outcomes are unified and the outputs complementary. A NASC, established to provide policy direction for the KAP and chaired by the Office of Te Beretitenti, was also used as a senior official steering committee of the NAPA. The CCST, a technical NAPA team chaired by MELAD, was also a technical team for the KAP. This structure will be maintained for KAP2 and NAPA implementation phase.

The CCST was originally established under the US In Country Climate Change Study Programme and continued under the PICCAP. Without support after the PICCAP had came to an end, it remained inactive until NAPA activities began and required a NAPA team and a steering committee. Members of the team that included most members of the inactive CCST were mobilised to form the NAPA team. The members revived the original name for their team; this also serves to reflect wider scope of their roles for Kiribati commitments under the UNFCCC and climate change generally.

1.4.5 Disaster, Climate Change, and Environment Management

The Natural Disaster Act 1993 sets out procedures to deal with disasters once they occur. The Environment Act 1999 is designed to enhance the resilience of, and minimize risks to natural and human systems.

The purpose of the Natural Disaster Act 1993 is to manage risks from disasters by adopting plans covering mitigation, preparedness, responses, and recovery. Most disasters are directly or in some way related to climate variability, climate change and sea level rise; such as cyclones, drought, flood or tidal waves, air disasters, maritime disasters, fires or bush fires, and a plagues or epidemics (e.g water borne diseases). The Act is implemented by the Office of Te Beretitenti.

The Office of Te Beretitenti (Office of the President) assumes responsibility for strategic risk management which will include responsibility for coordinating KAP 2 activities, and for the CCAS. Ministries will continue to implement adaptation activities within their allocated ministerial portfolios and as part of their MOPs.

The Ministry of Environment, Land and Agricultural Development is implementing the Environment Act which focuses on control of the adverse impacts of development and on pollution from wastes and other discharges. One of its objective is to enable Kiribati to fulfil its obligations under international environment conventions to which it is a party but does not cover any details on how this is to be achieved. Through implementing the Conventions to which Kiribati is a party, it is recognized that the Environment Act 1999 is inadequate.

A more comprehensive Environment Bill is being considered which has greater scope and flexibility to respond to existing and emerging environmental issues. In its current draft, it requires that the effects of climate change and climate variability be considered in environmental impact assessments of environmentally significant activities.

Disasters could also arise from failures to manage critical components of the environment. The MELAD is equipped to provide assessment of environmental risks that are likely to occur from internal and external causes, and its cooperation with the Office of Te Beretitenti is important to be able to deal more comprehensively with potential risks.

Chapter 2. Vulnerabilities, Key sectors, and Processes

2.1 Environmental stress symptoms

The wealth of the country is assessed by GDP which is essentially subsuming linkages of the sectors among themselves, and with human activities based on environmental resources. These activities constitute the livelihood of the people which in turn determines their wellbeing. This wellbeing is reflected in the level of intact of cultural values, general health, peace and prosperity.

Environmental stress symptoms have been identified, including in the 2004-2007 NDS. Low level of GDP per capita reflects population increase and the poor natural endowment of the country, but also environmental stress factors. The existence of "poorer people" reflects diminishing opportunities for earning livelihood due as well to environmental stress factors. Emerging "unacceptable level of inequity" could reflect degrading environment and eroding cultural norms due to attitude change towards the values of the natural environment and subsistence livelihood in a way that tends to downgrade such values. Environmental stress symptoms include deteriorating states of coastal zone, coral reef, fisheries, fresh ground water, and biodiversity; inadequate urban services such as water supply and sanitation; and overexploitation of natural resources in urban Tarawa. Serious symptoms are typified by prevalent diseases such as diarrhea and malnutrition, and cholera in 1977. Climate change and its impacts have exacerbated these environmental (without climate change) and development related challenges, and will continue to do so. Adaptation responses will also address these challenges.

It is on South Tarawa where much of the environmental related problems exist. These are closely linked to the difficulty as well of enforcing land use management strategies and controls.

At the national consultations, participants identified problems they experienced and the coping strategies addressing these problems. They then prioritized these coping strategies. Their prioritization results imply sector priorities as follows: water; agriculture; sanitation and health; economic development and culture; early warning weather extreme warning; coastal and settlement areas; biodiversity; infrastructure; and fisheries. More detailed information on the national consultations and prioritization is provided in section 5.

2.2 Settlement, land and coastal area

Land in the traditionally inhabited atolls of Kiribati is privately owned, in many cases by multiple owners of clear lineal connection, but registered under the most senior among them.

Traditional settlement areas or "kaainga" that were originally scattered anywhere along the island were relocated at existing village sites that now spread out along one edge of

the island, usually at a sheltered side from the prevailing easterly winds. These village sites were formally instituted in the early 1900s and each site consisted of few smaller settlement areas. Households living in any of these smaller settlement areas are generally descended from a common ancestor. The villages remain significant units of the whole island community.

Fig.5: Extensive erosion throughout Kiribati threatens the village institution.

Most likely climate change affects the processes of coastal erosion and accretion and these in turn threaten the village institution. A few cases of relocation of part of the village have occurred, with implications on the uses and sometimes conflicting claims over resettled land.

Both processes - erosion and accretion – are not new observations to the people. What is new is the observation that the traditional methods of checking erosion appear to no longer be effective as coastal land erosion becomes more extensive, intensive, and persistent. Erosion is an expected impact of sea level rise but difficult at this time with short data series to prove that sea level has in fact risen and caused the observed extensive erosion. The process of accretion is observed in the deposition of sediments to parts of the beach, or in sand bars formed on the lagoon platform. The processes of erosion and accretion have more serious impacts in urban South Tarawa where seawall protection, land reclamation, accreted land, uprooted coconut trees by shoreline erosion, dilapidated buildings that are undermined through erosion, and sand mining form mixed features of the shoreline.

Erosion threatens existing roads and buildings, which requires them to be protected. For public assets this is done by the Government, and for private assets it is done by their owners. The protection is in the form of sea defence of various designs and constructions. None of the sea defences have been totally effective and remnants of seawalls can be seen around South Tarawa and outer islands. Existing causeways and

seawalls need upgrading and strengthening if they are to last any longer. New causeways and seawalls, however, continue to be constructed. It was estimated in 1999 that coastal structures covered 45% of Betio shoreline in South Tarawa (GOK,1999). For the whole of South Tarawa, the total number of constructed seawalls was 60 in 2005.

Storm surges or extra high spring tide have caused flooding of residential areas. Traditional houses have raised floors, and this design has proved appropriate in times of flooding. Where flooding leads to erosion, or when persistent, people have to relocate themselves or retreat. Few incidents of this form of adaptation have occurred.

Fig.6: Traditional raised floor huts are adequate for a while!

More specific to South Tarawa, increasing urbanization are key drivers to changes to the shoreline. Other problems are squatters, unclear rights between landowners and land leased by the Government, enforcement of multilayered and sector requirements of the planning system, and relaxing of tenants conditions for Kiribati Housing Corporation houses. These are the challenges of development, but they act too as exacerbating factors to the vulnerability and barriers to the adaptation of South Tarawa to the impacts of climate change. Conversely adaptation projects will benefit the problems that arise from urbanization and other socio-development driving forces.

As people are responsible for much of the causes of the deteriorating urban environment, they are also the very resources to effect the change to sustainable urban environment. This change can come from increased public awareness of climate change impacts and rationales of any guidelines on coastal zone uses. This awareness can hopefully influence individuals in how they pursue their developmental lifestyles whilst at the same time avoid causing irreversible adverse effects on the environment- ecosystems and their functions.

2.3 Fisheries

"Diminishing fish stocks" is among the four observed major changes in the social survey (MacKenzie,2000) under KAP I. The other three are: coastal erosion; increased and more intense sunlight; and sea level rise. These three major changes are to be expected as results of climate change. Coastal erosion could result in sedimentation of coral reefs, and increased load of particles suspended in the sea columns. These may prove unhealthy for the corals and fish stocks. Intense sunlight has affected the corals such that dying corals have been observed and fish poisoning have been discovered from marine areas around Kiribati atolls that are not inhabited. Any temperature increase in inshore waters can affect movement of fish and it is a common experience that a drought period is associated with intense sunshine and low productivity of inshore fisheries.

Fish is the principal food for Kiribati people. It is known that the health of coral reefs is associated with fish abundance so that information on their state of health and restoration programmes where their health has deteriorated will assist in maintaining sustainable level of fish stocks. Enhancement programmes for specific stocks that are depleting will counteract any effect of climate change that could have diminished the stock productivity and at the same time arrest the tendency for over fishing across known fisheries.

Certain fish stocks, including shell fish, are depleting, causing serious concern for the livelihood of the urban population. Overfishing is generally considered as the only cause. However, there is anecdotal evidence that suggests other changes in the behaviours of certain fisheries, such as in their seasonal run and aggregation areas. This may point to other environmental stress factors (locally and globally generated) in association with overfishing. To some people the tastes of certain fish have changed from good to bad.

Whilst the communities consulted in the Social Survey recognized that population increase leads to excessive fishing and to structural changes to the shoreline, the ratings they gave on four categories - "not bad"; "bad"; "plenty bad"; and "worse" - for the problem of diminishing fish stocks and for the condition of the reef was 66% "bad" for both. This match between the "bad" ratings perhaps underscores the fundamental association of these two areas of concern in the experience of the communities. That experience reflects the real ecological proximity of fish and reefs, lends credibility to the survey results, and supports the communities own assessments of the changes in their environment.

2.4 Agriculture

Climate change will have pronounced impacts on agricultural systems in Kiribati, as it will for all countries. With very few agricultural crops that can grow on atolls, the impacts are very serious for Kiribati.

Adaptation strategy is to strengthen traditional agricultural systems, and diversify these systems and crops. Since traditional practices are difficult to change, agricultural extension services will be supported and incentives to farmers to diversify their crops will

be provided through establishing gene banks, introducing new crops, and exploring the feasibility of commercial processing of traditional tree crop products.

Coconut tree (*Cocos nucifera*) lives for a long time and is the most valuable tree for Kiribati people's livelihood. It is relied on for food, shelter, and the cash earning activity of copra cutting. Quite often particular coconut trees are scarred or marked to indicate land boundaries. They are also planted along the edges of the islands which prove valuable in gauging the extent of erosion.

Fig.7: Gauging erosion as losing land

When coconut trees are uprooted as a result of coastal erosion, it signifies that landowners are losing part of their land (MacKenzie,2004) and also a portion of their livelihood.

In terms of nutritional value, coconut might not be a fully wholesome part of Kiribati people's stable meal. The fruit of the pandanus tree (*Pandanus tectorius*) is considered to be more nutritional, and equally valuable as the coconut tree for Kiribati people's livelihood, however it does not provide cash earning potential. The coconut tree is the preferred agricultural tree as it is a cash crop. This has led, in part, to the observed loss of many species of pandanus and further limits the few varieties of agricultural food in Kiribati.

Pandanus fruit can be prepared into long term preserved food and this has been the practice in anticipation as well of serious droughts when the few tree crops wither and bear no fruit. The shoots of the pandanus tree that emerge from the lower part of the trunk to form on reaching the soil rooting system are widely used for traditional medicines. The root systems are believed as well to protect soil and coastal erosion. The diminishing of pandanus trees because of the uses stated can reduce the capacity of the people to adapt to adverse impacts of climate change.

Climate change through its impacts of sea level rise leading to coastal erosion, and more frequent and damaging storm surges bounding on the edges of the land will reduce agricultural productivity such as of pandanus varieties, and coconut.

Agricultural systems are seriously affected by drought conditions, sea water intrusion to land, and increased air temperature. Coconut trees and pandanus trees which are most resilient to dry conditions wither away during prolonged droughts. Other crops-breadfruit, banana, and bwaibwai are in a worse state.

It is from this experience that there is concern among landowners of water reserve areas that supply water for Urban Tarawa residents as to whether withdrawing large amount of water from the ground water lenses has not resulted in trees on the reserve being less productive.

A Ministry of Health and Medical Services report indicates a deteriorating state of the general health of Kiribati people: out of 5 persons below the age of 10, 3 are affected by Vitamin A deficiencies and malnutrition. A social survey report (McKenzie,2004) indicates that 56% have rated the change in the health of the people as "bad", and 46% as "plenty bad", reflecting the problem of food insecurity.

Fig. 8: Sea water that floods the land that threatens food security-pandanus trees.

2.5 Water resources

A ground water lens exists on the atolls and provides the main source of potable water for the great majority of the people on the outer islands. Within any atoll the quality of ground water lens with respect to salinity depends on precipitation and the width of the land. Climate change will affect precipitation and the width of the land through the process of erosion and accretion and these in turn determine the availability the lens. The northern atolls have higher rainfall than those at the south, but the more southerly islands

tend to be wider. Additional characteristics of atolls that affect the quality of the ground water lens include geo-physical and biological aspects of land formation which vary from site to site.

WHO guidelines for potable water limit sodium ion concentration to 250 mg per litre of water or about 1350 electrical conductivity units. A limit of 600 mg per litre or 2500 electrical units is adopted in Kiribati (Alam,K. et.al, 1997).

Available ground water within the atolls is limited and insufficient to meet the need of the people. On some atolls at certain villages, available ground potable water far exceeds the limit set by WHO guidelines.

A drought definition has been adopted by MELAD in 2003. However, this definition has not been applied to monitor precipitation for the purpose of identifying drought conditions. The definition is based on preceding 3 months total precipitation being less than 500 mm.

Ideally ground water wells need to be away from the villages to minimize exposure to contamination. However people find it convenient to have ground water wells within the village and households prefer to have a well dug out at their own house plot. Unprotected wells will always be contaminated from runoff during heavy rain. The alternative of having to fetch water from a well outside the village area will not be attractive nor it is in all cases practical. This is because sources of good ground water lenses in the vicinity of the village or over much of the island are not generally known. In anticipating climate change impacts on the ground water lens, it is important to know the extent of available ground water resources on the islands and to use this knowledge in planning adaptation measures for water resources.

Some villages are located on sites that do not have ground water lenses, either because the land is too narrow or that the water lens is very polluted as is the case on South Tarawa. For South Tarawa piped water system has been installed, distributing water throughout the stretch of about 35 km from protected water galleries. However, not all households are provided from this source, and wells are still used. Leakage in the water supply system is high and water charges are not based on metered consumption. The management system needs to be maintained and strengthened.

On outer islands various water systems have been tried in the past. Remnants of these systems are found on islands where they were installed. The current water supply technology is now solar pumps and overhead tanks near the villages. The costs of installing and maintaining such systems may limit its application to certain villages and atolls.

These socio economic improvements to the life of the people set themselves as the bases to build on adaptation measures to climate change impacts on water. Whilst climate change projections are for increased precipitation, the intensity and intra-annual variability are unknown and continuing reduction of the land area is expected. These

imply that droughts for the purpose of reduced ground water resources, and agricultural productivity can still be expected with the scenarios of increased precipitation.

In the Social Survey Report under KAP 1 (Mc Kenzie, 2000), 53% of the members of the communities interviewed regarded the change in water as "bad", and 47% rated it as "plenty bad". This is quite consistent with the ratings they give for a change in "rainfall" – patterns of seasonal distribution and intensities – which are 56% and 44% respectively, which is also quite consistent with the ratings they give for the changes in their health.

2.6 Physical assets

Large sums of public funds and external financial aid have been spent on constructing public physical assets and in protecting them from coastal erosion and storm surge risks, particularly on urban Tarawa. However construction of new assets, public and private, on and beyond the shoreline continues. These development challenges highlight the need for effective coastal management and development controls.

Public assets include roads, government buildings, wharves and jetties, causeways, airfields, schools and training centres, hospitals, and public corporations' properties such as those of the Port Authority, Kiribati Shipping, Kiribati Shipyard, and Kiribati Housing Corporation. These structures and designs had not taken account of climate change and some of them were established in the early 1900s as it is in the case of village sites and roads.

The main roads on all the atolls run along the shorelines, usually on the landward sides of dispersed village areas. At the portion of the road where there is a village, erosion first affects the village area and people respond by protecting their house plots. If protection of their plot fails they would move to other sites, leaving that portion of the main road imminently exposed to erosion which will require eventual new realignment on the retreating portion of the land. This is happening on some of the outer islands to eroded portions of the roads within and outside of the village areas.

Government is responsible for the main road on South Tarawa. Along coastal areas threatened by erosion differently designed sea walls have been constructed but all need regular upgrading or maintenance. Causeways are occasionally upgraded because they are rather frequently flooded during storm with gale force winds. Other public assets such as few KHC houses, government buildings, and infrastructures for water and sanitation systems need protection as well from erosion. Costs of the maintenance or replacement will increase with time that they have been allowed to absorb the forces of climate related hazards.

Private and community assets include commercial, industrial, and residential buildings, church establishments, and "mwaneabas". In urban Tarawa people construct seawalls to protect their assets. In certain cases, government assistance is provided to protect some of the assets located at sites exposed to flooding from storm surges or from extra high spring tides.

It is a combination of development challenges - urbanization, socio-economic development - with climate change impacts now that require some structural adaptation as well.

2.7 Biodiversity

Preliminary inventories of biodiversity have identified limited levels of biodiversity. Systematic classification within major and broad types of organisms is required to better determine the level of biodiversity in Kiribati.

Some of these organisms, at the species level may be endangered or already extinct. Of the species of pandanus trees (*Pandanus tectorius*), about a quarter could be endangered if not extinct, and for breadfruit trees (*Artocarpus sp.*) one species may be extinct with five remaining. Of the prestigious bwabwai root crop (*Cyrtosperma chamissionis*), two species out of 20 species could be rare if not endangered. The loss of biodiversity in food crops directly affect peoples livelihood and it also causes worries about genetic erosion which could result in poorer quality of food and health of the people.

All trees and plants and other organisms have useful functions in providing raw materials and other services required in various aspects of the Kiribati way of life. A decrease in the level of biodiversity implies further impoverishment of the subsistent livelihood and the wellbeing of the people and endangers the sustainability of human habitation on the atolls.

Loss of biodiversity is an indicator of general environmental degradation, with unfavourable implications on the livelihood of the people and the adaptive capacity of the whole of the atoll system.

Islets or motu act as models for bigger islands of Kiribati atolls. Coastal erosion is evident, coconut and pandanus trees are water stressed and withered on the soil surface that has been decreasing to hold moisture, and ground water lens gets brackish. Low and short lived shrubs become more luxuriant, and take over the diminishing motu and at that stage, the motu becomes uninhabitable. Several motus are experiencing this deteriorating process. Terrestrial plants and trees have gone – a loss of biodiversity specific to the motu, and this has in part at least been due to temperature increase in the first place, and sea level rise following.

Whilst there is lack of knowledge as to why there has been loss of some of the species of fruit trees and “bwabwai”, it is possible they could be more sensitive to the changes in their environment. One of the changes for Kiribati is clearly temperature increase. Sea level might have also risen.

2.8 Health

"Human health is the recipient of all downstream effects of the impacts of climate change on other sectors …" (MHMS, 2004), such as agriculture, fisheries, water supply, coastal areas, biodiversity resources and waste management.

A fatal outbreak of cholera occurred in 1977, dengue fever - fatal among children - occurred in 2003 and 2004, whilst diarrhea and fish poisoning are quite prevalent throughout Kiribati. The spread of cholera in 1977 had been facilitated by contaminated ground water and lack of sewerage system in high population density urban areas.

Dengue fever is carried by a certain mosquito species, and this would be responsible for the outbreaks of the disease in 2003 and 2004. This species is said to thrive well at an average temperature of 31 degrees Celsius with rainfall of 500 mm per month (WB,2000). The mean annual temperature has been quoted as between 26^0C and 31^0C (Wilson,1994) and it is possible that with climate change Kiribati temperature could prevail at the upper bound of that range. This would be more conducive for the mosquito species.

Diarrhea can reflect the poor quality of water and sanitation, and also "existence of poorer" people. Rain flooding causes runoff into unprotected wells, and higher rainfall expected from climate change can increase the incidence of diarrhea. Onset of raining season has been associated with diarrhea and it is a traditional knowledge that the start of spring tide is associated with diarrhea among infants and children. Rainfall pattern and sea level rise that are expected from climate change can affect the incidences of diarrhea.

Fish poisoning can be caused by inadvertently eating a poisonous fish since species of fish that are potentially poisonous and marine areas associated with them are generally known. The safety rule is simply "don't eat the particular species caught from the particular area'. On occasions, however, people took the risk of eating the species of fish from the known area and from this these people got poisoned, but they recovered, and reasoned that there was no lasting effect. That they took the risk could be adventurous but could also be due to "existence of poorer" people. This is an indirect link between fish poisoning and climate change. A direct link is from some studies that have shown that there is significant correlation between sea surface temperature and the reported cases of fish poisoning (WB,2000).

These diseases, according to results of models for the Pacific islands countries, are expected to be more frequent and more severe as a result of temperature increase and accelerated sea level rise. With such a scenario, a drought occurrence would have very serious implications. As noted in Kiribati Climate Change Adaptation Policy and Strategy: "droughts and storms have shortened lives and damaged or destroyed resources and assets as long as the atolls have been inhabited". Drought conditions in Kiribati are very brackish ground water lenses, minimal agricultural and marine productivities, and spread of some diseases.

However, as further noted optimistically in the Policy and Strategy "over hundreds of years communities and households in Kiribati developed great resilience in the face of climate-related hardships". But, climate change will most likely exacerbate these hardships, and, together with its impacts on health, climate change could overpower this "great resilience" of Kiribati.

NAPA project profiles on all sectors will contribute towards minimizing the chances that these diseases would break out. Profiles on water resources, agriculture, fisheries and coral reefs, and coastal zone management will make pronounced benefits of improved environment and resources that are less conducive to the occurrences of the diseases.

The Social Survey Report (McKenzie,2004, p.47) notes that "changes had been going on for years, but in recent times, in the last 5 to 15 years, they have taken on new forms, or become more intense and severe that they become very different from the originals that people or their forefathers were familiar with". An example of this is the seawall which addresses the risks of "coastal erosion, inundation, and storm surges". People change now their perception of the traditional seawall; it is no longer effective since the characteristics of the risks have changed. This could also be expected of their perception of their own general state of health as now exposed to new forms of diseases.

Chapter 3. Framework for adaptation programme

3.1 Introduction

A framework should be informed by climate change at a local level. It is for this purpose that trend analysis of temperature, rainfall, sea level and storm surges are included. Other components of the framework are: Climate change projections; NAPA Integration into National Development Planning; Linkages with other MEAs; and Potential barriers to Implementation of the NAPA, and the Climate Change Adaptation Strategy.

3.2 Analysis of Kiribati climate and sea level records

Temperature data from 1970-2000 indicate an increase of 0.019 degrees Celsius per year, a factor of 1.6 lower than our estimation of the global temperature increase for the period 1995-2000. Trend analysis shows that there is a higher positive trend for the maxima than the positive trend for the minima.

Rainfall has a negative trend of about -0.03% of the 1970 rainfall, compared to a positive trend of about 6% for a longer data series from 1947 to 2000. However in both cases the annual standard deviations show negative trends.

Sea level records of 1994-2000 based on the Australian National Tidal Facility tide gauge at Betio show a decreasing trend, and asymptotic trend fluctuates over the period with a negative value at the end of the period and has not shown a convergence pattern. However, earlier studies (Solomon, cited in GOK,1999) that incorporate data from the early 1970s obtained from another Tide Gauge indicates a rise of sea level of 3-4 mm/year.

Storm surges have not been regularly monitored. Assuming that a storm surge occurs when wind gusts exceeds 8.7 m/sec for at least 24 hrs, the worst year for storm surges and flooding during the period 2001-2005 could be the year 2002. But from casual observation, the most damaging storm surge could have occurred during 2005. Storm surges could be more frequent and severe now.

3.3 Climate change projections

The table below has been adopted in the CCA Policy and Strategy as climate change scenarios; temperature and rainfall are based on MAGICC 4.1 using CSIRO 2, HadCM3, and CCCma1 models. Sea levels are based on SIMCLIM models.

Table 1: Climate Change Scenarios

Climate change indicator. Year	2025	2050	2100
Mean sea level rise (centimetres) relative to the level in year 2000	**+6 cm** (+3 to +10)	**+14 cm** (+6 to +26)	**+39 cm** (+12 to +83)
Change in annual mean air temperature (degrees Centigrade) relative to year 2000	**+0.4 °C** (+0.3 to +0.5)	**+1.0 °C** (+0.8 to +1.4)	**+2.3 °C** (+1.3 to +3.5)
Change in annual mean rainfall relative to year 2000	**+3%** (+1% to +7%)	**+7%** (+2% to +17%)	**+15%** (+4% to +46%)

The ranges of the uncertainties in the scenarios plus international efforts to implement the UNFCCC and the Kyoto Protocol give hope to Kiribati in actively pursuing adaptation strategies and programmes.

3.4 NAPA Integration into National Development Planning

The framework of national development planning is the National Development Strategy (NDS) covering 4 years to coincide with the life of parliament. The budget prepared annually covers 2 years, that is, 1 year backward and the current year.

The current 2004-2007 NDS notes that climate change is posing costly risks to economic growth, and calls for the development of "participatory and cost-effective ways of minimizing and managing risk of loss from climate change-related events". This gives an opening for integrating climate change adaptation planning into national policy development, and planning and implementation of strategies and activities.

Whilst climate change has far reaching implications to all aspects of Kiribati, the 2004-2007 NDS can only treat climate change as one issue among many other issues. The NDS does not therefore reflect the overarching implications of climate change. In the NDS we note under "Mineral resources" sector, the need for "replacing beach mining on Tarawa" with "private investment in deep lagoon dredging of aggregates" but there is no indication that this will be crucial for adaptation. Another illustration is NDS referring to "potential social economic impact of climate change is costly and dangerous" and "participatory development strategies to manage increasing risk, and design cost effective adaptation measures for use nation-wide" are relevant consideration for a long term basis of planning. But this is also relevant to the equally important and urgently needed implementation stage.

The NDS has anticipated that adaptation planning has to be integrated into the mainstream of national socio-economic planning and budget control. Equally, the NAPA

process aims to get adaptation integrated into the national socio-economic policy and planning in a way that adaptation are consistent with national policies and alleviate poverty. Mainstreaming is also an important objective of the KAP.

There are many areas of similarities in the two projects. Both include National Consultations to identify vulnerabilities and adaptation options. The same officials were involved in both, but the projects were separately under two different Ministries. Their objectives are different as KAP focuses on mainstreaming and adaptation investment preparation. By the nature of these objectives, medium to long term time horizon is expected. On the other hand, NAPA will communicate "immediate and urgent" adaptation needs.

KAP hires several international technical consultants and advisors who could have much influence on the course of KAP activities, whilst the NAPA is largely of national consultative inputs but could be disadvantaged for lack of international credibility. To optimize the benefits for Kiribati from the two projects, a one management structure for both was established. This is in the form of the Climate Change Study Team, and the National Adaptation Steering Committee.

Collaboration in the implementation of NAPA and KAP has resulted in the sharing of information, capacity building of national players in adaptation planning, and cooperation between donor countries and Kiribati. As a result of shared information, the two projects are able to identify projects that are complementary. For example, KAP emphasis on coastal adaptation is on the need to research into parameters affecting coastal erosion and for a designing of protective measures, but to embark on protecting a selected key infrastructures of wide national significance. NAPA will consider strengthening coastal management institution and land use planning through empowering local government to assume that responsibility.

Integration of adaptation planning into national planning and budget management processes requires that adaptation projects are consistent with national development policies and strategies, and are part of Ministries operational planning. The Ministry of Finance and Economic Development should have the capacity to advise on and monitor this process. Adaptation planning is a long term commitment and while the NAPA addresses immediate and urgent needs, they should be consistent with longer term adaptation vision.

The CCA Policy and CCA Strategy elaborate on the long term basis of adaptation planning and implementation. The CCAS stresses eight focal areas:

integration of CCA into national planning and institutional capacity
use of external financial and technical assistance
population and resettlement
governance and services
freshwater resources and supply systems
coastal structures, land uses and agricultural practices
marine resources

survivability and self-reliance.

The CCA Policy and Strategy envisages a one structure for implementing NAPA and KAP. The CSST became a technical team for both NAPA and KAP and the NASC established for KAP became a steering committee for the NAPA as well.

NAPA project profiles are consistent with these focal areas.

The 2004-2007 NDS, supplemented by the CCA Policy and Strategies and the government budget, provide a framework that allows integration of NAPA climate change adaptation into overall national policy development, the planning process and budget management. Ministry Operational Plans (MOPs), prepared annually, serve as work plans for the current year and one or two years forward, and translates the issues and broad strategies of the NDS and CCA Policy and Strategy into programmed activities consistent with the budget framework. Ministries should be certain about budget provisions, forthcoming availability of funds and their capacity to implement activities before including them in their MOPs. NAPA implementation will follow this national planning, implementation and budget management systems.

3.5 NAPA linkages with other MEAs such as CBD, and CCD

The Ministry of Environment, Land and Agriculture Development is compiling data and information on biodiversity inventories, developing a National Biodiversity Strategy and Action Plan, and developing a National Biosafety Framework under the Cartagena Protocol.

KAP/NAPA national consultations and the social survey brought out some clear examples that demonstrate the strong linkages between biodiversity and climate change. More detailed information on the national consultations is provided in section 5.2 below. Diminishing fish stocks seems to be a more noticeable change than diminishing of terrestrial biodiversity. However, in survey works undertaken for the preparation of the NBSAP, serious depletion and in some cases real loss of some fruit tree species is evident.

Biodiversity is linked to climate change as it is both an important source and sink of greenhouse gases and serves adaptation needs. For example, mangroves and coral reef provide cushioning effect on wave forces on the land, and harness fisheries productivity. Conversely, successful adaptation to climate change means that the natural environment and ecosystems are resilient to climate change impacts thus maintaining the status of biodiversity. The adaptation and biodiversity projects work toward the same objective of ensuring sustainability of the atoll systems of Kiribati. The work includes a listing of terrestrial and marine life forms, extensive awareness programs and community participation including of youth groups.

Biosafety is a concept that focuses on safeguarding natural systems from unknown risks that can be associated with release of living modified organisms, particularly through

transboundary transfers. Unknown impacts of LMOs on natural ecosystems pose additional uncertainty on any assessment of the vulnerability of ecosystems, and people, to climate change. A framework is being developed to establish regulatory regimes to safeguard against unknown entry of LMOs in whatever form, and to provide for their safe handling and management.

Climate change, desertification and land degradation are directly linked. The intra and inter annual variability of rainfall associated with ENSO are unknown under climate change regime, although rainfall is projected to increase on a multiyear basis. The occurrence of drought conditions can be expected. These conditions when aggravated by other climate change impacts at play in the whole atoll system, may occur even within a short dry period. Once a state of emergency due to drought in the late 1990s was declared and supported by the local experience of drying water tanks, withered breadfruit trees and coconut trees. On investigation, however, it was ascertained that water lenses supplying piped water to residents on South Tarawa still held vast amounts of potable water. This discrepancy may suggest that agricultural productivity is becoming less resilient to shorter periods of dry conditions. In this sense, the occurrence of drought effects may be more frequent and severe.

Drought effects are characterized by the ground water lens turning more brackish, dry soil, and noticeable reduction in agricultural productivity starting first with less resilient crops and ultimately coconut. Fisheries productivity seems as well to decrease. Once these conditions were unmanageable; lately with economic development and participation in the global economy the seriousness of drought effects have been somewhat cushioned. Nonetheless, still once any of these conditions sets in, recovery of the resources may be quite difficult in the face of progressing environmental degradation and other climate change impacts. This can lead to land desertification if we do not implement adaptation measures; if we do not implement comprehensive adaptation measures, later implementation would be much more costly. The subsistence livelihood could continue driven into more impoverished situation.

3.6 Barriers to NAPA, and Climate Change Adaptation Strategy

Section 1.4.2 of the objectives of the Climate Change Adaptation Strategy require Kiribati to be prepared – mentally, institutionally and financially – for any type of climate. External assistance is necessary for Kiribati to be financially prepared. Optimal success of the implementation of the CCAS requires that the three aspects must go together and be synchronized. An effective institutional mechanism for keeping in focus adaptation needs and managing projects is very important. The NASC and CCST serve this requirement.

A potential risk for NAPA is that it could be construed by aid agencies as being subsumed under KAP II. To address this, responses to climate change can be considered along two separate but unified perspectives. NAPA considers “immediate and urgent” needs that are either not covered or inadequately covered in activities of KAP II. KAP II addresses long term planning and piloting of small scale adaptation. For example, coastal

protection structures that have been partially destroyed and are ineffective to protect roads or settlement areas from imminent risks from coastal erosion will be addressed by NAPA. A longer term need for a design of coastal protection that take account of climate change will be developed under KAP II. KAP II will develop a Master Water Plan for urban Tarawa and other parts of Kiribati, whilst the NAPA will improve wells used by households by protecting them from flooding. A table showing the complementary nature of the KAP and NAPA is attached as Attachment 1.

There is a further risk to the NAPA that Ministries and decision makers may discount climate change as a contributing factor to observed environmental changes. This will be addressed by strengthening Kiribati capability to access and understand IPCC reports and assessments on the state of science knowledge on climate change and for useful information to be widely disseminated to Ministries and the public. Kiribati needs at the same time to strengthen its ability to plan and implement adaptation projects. In these regards, Ministries need to mainstream adaptation into the national planning and budgetary management with special responsibility of the MFED to provide continuing guidance. Kiribati needs to find a careful balance between the need to act now, including visible investments that can also help to raise the public profile of adaptation, and the need for careful risk diagnosis and options analysis. We believe the two should go hand in hand.

Implementation of the NAPA may be hindered by certain provisions and gaps in current and relevant laws and regulations. The current Environment Act 1999 regulates for their environmental impacts, development that are industrial and commercial but not private or public development. Moreover, there are no clear guidelines supported by legislation on controls of offshore constructions such as jetties. Building sites are not adequately controlled to avoid potential risks from coastal erosion. Adequate legal provisions addressing biodiversity are not found in Kiribati laws. Enforcement is also a problem that needs to be addressed if laws are to be effective. Kiribati government is considering a new environment legislation that addresses these gaps.

Chapter 4. Identification of key adaptation needs

4.1 Past adaptation practices

Adaptation to climate change adverse impacts is a new experience for Kiribati. In the past extreme weather conditions such as droughts, storms and storm surges, rainfall flooding, and sea water flooding as well as spread of fatal diseases have occasionally occurred but people have lived and in dignity through them. Past practices to cope with these extreme weather conditions included the preservation of traditionally prepared foods from crops that were regarded of great social values. This conventional lifestyle may have dissipated partly because of increasing integration of Kiribati into the world economy with corresponding erosion of traditional values. These socio-economic facts exacerbate the vulnerability of the people to extreme weather events because the change in their social values does not encourage preparation based on natural resources for these events, but these resources were what they had depended on in the past. At the same time, people are more exposed to economic vulnerability.

There had been no traditional way to ameliorate the problem of water getting brackish during drought. When the closest well within the village became brackish, people would turn to the known next closest well of lesser salinity, usually at further distance away. Whilst climate change scenarios project higher precipitation on multi-year basis, seasonal variability is unknown and droughts will still be expected in the climate change related weather pattern. Inter annual variability of rainfall is unknown but La Niña as part of the ENSO will continue to bring dry conditions to Kiribati. Furthermore, sea level will increase and erosion is anticipated as a consequence, thus the risk of reduced groundwater lens exists. As climate change impacts progress, there might not be ground water lenses remaining as they are now. All could turn in time to be very brackish. The now traditional coping strategy for drought that involves getting water from the next nearest source of fresh ground water will increasingly become inadequate under climate change.

Storms and storm surges can occur for several weeks, but are particularly strong for few days. During such times, people might camp out at sheltered side of the island, and houses in the village had to be propped up with extra timber supports. A cooking shed usually had a supply of firewood that was preserved for this occasion. Preserved fish such as sun dried salted fish, or dried shark meat and skin were likely to be the only protein food. These traditional ways including the type of housing reduce the costs of vulnerability to storm and storm surges impacts. They could remain adequate but in the case of housing the demands on local building materials can increase and with climate change that may lead to greater stress on trees and plants, local housing could deteriorate in quality. Firewood abundance could decrease as well.

More residential houses and other buildings are of more permanent imported materials. For these buildings, there is no traditional adaptation for them and they just have to meet the costs of damage from storms and storm surges should damage be occasioned. These forms of economic development bring out the need for new forms of adaptation such as

in the form of coastal zone management and land use management. Hard structural options protecting them from the shoreline erosion has been going on for while but none has been totally effective and all require upkeep.

Timber seawalls and seawalls of stones built perpendicular to the shoreline, particularly the first, were traditional ways of protecting houses and house plots within the village from storm surges and from coastal erosion. These are no longer effective for that purpose. There are now more complaints about sea water over wash getting into houses, wells, and bwabwai pits, and coastal erosion occurring unchecked.

Fig.9: Giant taro in pits affected by sea water intrusion

The traditional purpose for which preserved fish were valued may have lost its significance for the same reasons that preserved agricultural products have lost their significance. This fact could only increase the vulnerability to climate change. Increasing storminess, sea temperature can result in decreased fisheries productivity. This means impoverishment of the life of the people even if people can afford to buy tinned fish.

Strengthening traditional values and practices in particular cases can therefore be considered as adaptation measures. Economic development contribute to national adaptive capacity if at the same time environmental impacts of related activities to the economic development do not result in a worse state of the environment than what it had been. For example, from income that flows from economic development people will be able to live on imported food during storms, build permanent housing structures and protect them from storm surges or coastal erosion. If however this economic development is based on excessive removal of sand and aggregates from the shoreline then it might leave the atoll environment worse off for providing particular services and

functions that support the livelihood of the people. Environmental legislation can provide guidelines to screen and ensure that development activities and traditional practices are not barriers to adaptation.

Certain parts of any atolls are clearly more vulnerable than others. A village area is considered to be more vulnerable due to the risk of inundation of human settlement than the lower land outside the village. However, the latter will be more vulnerable for agriculture purposes. Limited resources only allow a few of the competing vulnerable sites to get attention for adaptation. In the small area of the atoll, this situation adversely affects the livelihood of the people.

Rainfall pattern and trend are expected to change, whilst temperature and sea level are expected to increase. People claim that these changes are already being experienced. In addition, they claim that tree crops productivities have changed. There are limits to the extent to which traditional adaptation practices can cope with these impacts.

4.2 Identification and implementation of coping strategies

Through the National Consultations, technical reports provided under KAP I, and the Initial National Communication, a broad range of coping strategies were developed. These strategies formed the basis from which the Climate Change Study Team has identified adaptation projects that are proposed in this NAPA document. More detailed information on the Consultations and prioritization processes are given in section 5 below.

Climate variability, climate change related hazards and risks, and impacts on the livelihood of the people, are readily recognized as requiring immediate responses, even without taking into consideration their long term impacts.

Resources such as water resources, coastal structures, roads and other physical structures, land space, agricultural resources, and terrestrial and marine resources are at risk. Communities who are living with these risks are not equipped to solve the problems they experience as they do not have the financial and technical capabilities to do so. A UNDP project executed by the Ministry of Internal and Social Affairs may assist in building up the technical capabilities of the communities for project planning and management, including good governance at the local government level.

Governance and services will include institutional arrangements for managing and mainstreaming adaptation strategy, and improvement and upgrading of the Kiribati weather observing system. A National Strategic Risk Management Unit is being established and through the NASC and CCST will coordinate adaptation activities. The NEPO will assume extra responsibility for the integration of adaptation activities into the national planning and budget management processes. This is to be achieved through NAPA activities proposed for the NEPO.

The ECD has acquired technical information and knowledge of local and global environmental issues and linkages through implementation of MEAs. NAPA proposals will support and strengthen ECD capability to implement the MEAs. All levels of governing and decision making play important roles in the undertaking of adaptation.

Population size and growth rates, as pointed out during the National Consultations, have significant impacts on the state of the environment, aggravating vulnerability and adaptation needs. In this respect, population policy is an important consideration of adaptation strategies.

External financial and technical assistance make international cooperation for adaptation possible, and facilitate technical capacity building of ministries in addressing climate change.

Ministries will implement NAPA project activities that fall within their respective responsibilities. They will follow the established budget management system, the MOPs mechanism, and the monitoring and reporting mechanisms. In addition, MELAD in close collaboration with the OB will provide oversight through the NASC and the CCST of all the NAPA project profiles. The NEPO will additionally facilitate mainstreaming and monitoring of NAPA project profiles.

Chapter 5. Prioritizing key adaptation needs

5.1 Prioritization criteria- development and application

The National Consultations under KAP I identified coping strategies and allocated priority ranking to each of the strategies. There are about 50 coping strategies. Awareness raising is a top priority. The remaining coping strategies each has scored a priority ranking which, when taken as that of the most corresponding sector, sector priorities are thereby determined. Accordingly, vulnerable sectors in order of priorities are: water; agriculture; sanitation and health; economic development and culture; early warning weather extreme warning; coastal and settlement areas; biodiversity; infrastructure; and fisheries.

Other priority criteria were later developed by the NAPA Team in conjunction with the WB technical advisers. They are (i) degree of adverse effects/vulnerability being addressed; (ii) cost relative to benefits; (iii) timing/ urgency; (iv) environmental impacts; (v) culturally acceptable; (vi) level of implementation; (vii) participatory; (viii) synergy with poverty reduction; and (ix) synergy with other multilateral environmental agreements. Based on these criteria each member of the NAPA Team (also called the CCST) prioritized each of the coping strategies across all of the criteria.

Each member of the NAPA Team (also called the CCST) prioritized each of the coping strategies that were identified at the National Consultations across all criteria. The prioritization results of the members for each of the strategies were summed up and averaged to give for each of the strategies its ranking. This set of ranking was modified by weights that the CCST decided to allocate to each one of the criteria and in applying these weights.

Additional criteria were taken from the NAPA Annotated Guidelines including criteria related to concerns about vulnerable systems in Kiribati. They are: loss of life; food security; health/disease; settlement area; capital infrastructure; and loss of biodiversity. Members of the CCST applied them in a similar way as they did for the first set of the priority criteria. This provides additional priority rankings of the coping strategies.

The first set of criteria is directly related to the coping strategies whilst the second set is not but relates to the purposes of vulnerability and assessment on these purposes if each coping strategy as being prioritised were not to be carried out. For example, if a water coping strategy were not to be carried out, then this could lead to increased vulnerability to drought and in turn lead to some values between 1 to 7 on the variable “loss of life”.

Separate priority rankings based on the two sets of criteria were combined to give the final priority rankings adopted by the CCST. This final ranking has as its first priority a coping strategy expressed in the National Consultation as “prohibit types of development that destroy the environment”. This may well reflect a notion of sustainable development. The next priorities are in this order: water; agriculture; land management;

coastal protection; awareness raising; fisheries; and family planning indicative of concerns on social development.

The coping strategies identified and priorities set by the National Consultations were to form basis of NAPA project profiles and priorities. Members of the CCST initially identified project profiles and subsequently decided on their priorities that are based on priorities of the coping strategies as set by the National Consultations, combined with the priorities of these strategies as set by the CCST themselves and as described above.

A method of determination of the priorities of the project profiles that conserve the essence of the coping strategies and National Consultations prioritization is simply taking a project profile and find a coping strategy that is similar to it. That project profile will then have a priority of the coping strategy as determined by the National Consultations, and another priority as determined by the CCST. These two priorities for the project profiles are simply added. From these sums for each of the project profiles, priority rankings are derived. These priority rankings are as shown in the table of project profiles.

To illustrate the method, we take a project profile "water resource adaptation" and find that it is similar to a coping strategy "installation of rainwater tanks" which has a priority ranking of 8 by the National Consultations, and of 2 by the CCST. These give a total of 10. Another profile is "project management institutional strengthening for NAPA" which we consider similar to a coping strategy "prohibit types of development that destroy the environment". This strategy has a priority ranking of 19 by the National Consultations, and of 1 by the CCST, giving a total ranking score of 20. In this way all project profiles have their ranking scores, and these scores determine the priorities among all the project profiles.

As already noted in section 4 above, project profiles as proposed for the NAPA document will address climate related risks that are already occurring, and therefore are "immediate and urgent" needs for adaptation.

5.2 National Consultations

Two series of national consultations were held in 2003, one for the Gilbert group, and the second for the Line Islands group. The third series of workshops for the separate groups were held in November 2005 for reviewing the project profiles that were to be proposed in the NAPA document.

Detailed planning for the first National Consultation was carried out by the National Adaption Steering Committee and involved members of the CCST. These consultations were among the activities of KAP I, but their purposes were not different from those that were intended of the NAPA similar activities. ECD staff who later became members of the NAPA Project Management Office were directly involved in the planning. KAP technical advisors assisted with this planning as well.

A Working Group was specifically set up to make plans for the workshop. The Working Group met once and came up with the objectives of the workshop: identify vulnerability; coping strategies; and ways for which government may assist the communities with the coping strategies. It was further decided that participants when they identify vulnerabilities and changes should not be influenced by sector presentations, but they need first to understand the concept of vulnerability and be sensitized about CHARM tool before they proceed to identify incidents of vulnerability. Accordingly sector presentations from members of the CCST followed lastly.

It was further planned by the Working Group that participants would break up in groups when identifying incidents of vulnerability, and that the grouping would capture the differences between islands that have lagoons and those that are table reefs. South Tarawa which is urban had a separate breakout group and included representatives from NGOs and various faith based institutions that are registered. There were thus three main groups, and within each group two subgroups were further formed: one consisted of chief councilors (each island has a local government council), representatives of unimwane (elder men with traditional leadership role), and council clerks; the second subgroup were women, and youths. These compositions were designed to avoid cultural inhibition of women and younger men to talk against or on equal footing with unimwane. There were in all 6 breakout groups to identify incidents of vulnerability and coping strategies.

Explanation of the national development planning process leading to the adoption of the 2004-2007 NDS was included on the programme. The purpose for this was for participants to have better appreciation of the government planning process in anticipation of the requirements of mainstreaming adaptation.

The 50 or so coping strategies were brought up to the second national consultation for prioritization.

The second series of national consultation took place during the 3rd-6th November 2003 for the Gilbert Group, and from 3rd to 5th December 2003. Documentations for the Second National Consultation included a list of coping strategies that were identified during the First National Consultation. The Second National Consultation was to prioritize these coping strategies.

Participants at the Second National Consultation were Chief Councillors, Clerks, and Island Project Officers from the 20 local government councils (one for each of the 18 islands plus two councils for the South Tarawa Urban area in the Gilbert group). Breakout groups were formed and worked separately to allocate priorities to the coping strategies, to delete any they considered inappropriate and to add any they thought were overlooked at the First National Consultation. Five breakout groups were formed: participants from table reef islands formed one group; participants from islands that have lagoons were split into 3 groups based on proximity between the islands they represented; and participants from South Tarawa formed another group.

The outputs of the second consultation are prioritized coping strategies based on the two operations: first on four broad criteria, and then on informal-based criteria. The broad

categories were: A) Things that we can do right away; B) Things that want to do right away, but for which we need help; C) Things that are somewhat less important/urgent; and D) Things that we do not (yet) need or want to do. Whilst initially the breakout groups worked separately to allocate priority rankings above (A-D) for each of the coping strategies, they came together in plenary to agree the priority ranking in the case where their rankings differ.

In the second operation, the break out groups ranked each of the coping strategies on informal-based criteria, that is, criteria that were not specified. The rankings of all groups were simply averaged to give the National Consultations rankings of the coping strategies.

The priorities given to coping strategies based on the two operations are not consistent, that is, a coping strategy assigned with a broad priority criteria marked "A" can have a lower priority ranking in the second operation than another that was assigned with a priority criteria marked "B".

The priority rankings in the first operation are not incorporated into the refined prioritization undertaken by the Climate Change Study Team. However, the priority ranking of the second operation were, as explained in 5.1 above, combined with the CCST prioritization results to determine the priority rankings of the NAPA project profiles.

From 14th to the 16th November 2005, the Third National Consultation for the Gilbert Group took place. For the Line Group it was held from 23-25th, 28th November 2005. Participants for the Gilbert Group were Chief Councillors, Clerks, and Island Project Officers. In addition representatives from NGOs, and registered faith based institutions on South Tarawa attended.

The Third National Consultation was devoted to presentations of sector projects that are identified for the KAP and those that are identified for the NAPA. NAPA projects are based on those that are identified at the preceding consultations.

The National Consultations had not extended its consideration to the vulnerability of public physical assets. Already government or external aid funds have been spent to protect parts of the public roads, government buildings and establishments, telecommunication and water and sanitation infrastructure. Upgrading of wharves and jetties and causeways have been undertaken. Airfields, and hospitals could need protection. These structures and designs had not taken account of climate change and some of them were established in the early 1900s as it is in the case of village sites and roads.

5.3 NAPA Team

The NAPA Team, renamed as the Climate Change Study Team, initially adopted the criteria of prioritization as explained in 5.1 above, but they consider the "no regret" criterion to be inappropriate for optimal adaptation in Kiribati circumstances. However,

this is not to overlook the fact that some of the traditional ways of addressing extreme events of the weather are pointers to adaptation strategies on the "no regret" criterion. These include traditional practice of food preservation in anticipation of extreme events such as droughts or bad weather conditions for fishing, and forms of coastal protection such as timber walls at the shoreline, containing fronds of coconut trees and other wastes. There is at the same time the sense that traditional ways of coping with the extreme weather events are no longer adequate because the nature of the events have changed from being manageable to being unmanageable.

Urgency of the NAPA proposed projects is evidenced by the prioritization criteria. These criteria are relevant to the consideration for both the soundness of the project profiles, and the vulnerability of Kiribati from climate variability, change, and sea level rise.

A list of members of the Climate Change Study Team and sectors they represent is given in the front page.

Chapter 6. List of priority activities and project profiles

6.1 The list of project profiles are presented in the table below.

Table 2: List of projects

Ranking	Project Profile Name	Activities
1	Water Resource Adaptation Project	Development and implementation of "Demand" pricing system for South Tarawa. Improved Maintenance of existing water supply system. Improvement on existing wells. Risk assessment of water resources. Impact assessment of urban groundwater supply system. Awareness raising. Sustainable community based monitoring system Planning for Drought, its effect on Operations and Distribution. Institutional strengthening and capacity building for sustainable water management.
1	Simple well improvement	Visits by MHMS to outer islands to introduce the project through village welfare groups. Regular monitoring visits. Provide materials for mold for wells.
2	Coastal Zone Management and Resilience Enhancement for Adaptation	1.Awareness raising 1.1 Workshops and materials 1.2 Monitor and report climate related risks to coastal areas 1.3 Prepare for local authorities and communities a manual on risk management tools such as CHARM 1.4 Public Media programme 2. Protecting and enhancing resilience of coastal assets 2.1 Enhancing traditional coastal protection systems. 2.1 Mangrove planting 2.2 Establish community groups for coastal zone protection and resilience enhancement. 3. Information and Data 3.1 Community-based vulnerability mapping 3.2 GIS use and equipment 4. Institutional strengthening 4.1 Streamline different legal controls and permitting system requirements 4.2 Support to various coastal committees 4.3 Review of relevant laws affecting coastal management.
3	Strengthening	Compile for CCST key information from IPCC

	Environmental, Climate Change Information and Monitoring	Assessment Reports. Equipment, computers and soft ware List studies and data on researches on Kiribati and summarise conclusions Document risks when they occur Review of studies Technical assistance
4	Project Management Institutional Strengthening for NAPA	Mainstreaming NAPA • NEPO assign staff members to provide oversight of mainstreaming of NAPA projects • NEPO check consistency of NAPA outputs with NDS, CCA policy, and poverty reduction strategies. • Assigned staff members liaise with Ministries to include outputs of the NAPA projects into their MOPs. • NEPO and NAPA PMO provide guidance on defining outputs of the NAPA projects for inclusion in MOPs. • NEPO facilitate flow of financial resources for the NAPA. Monitoring and Reporting • Incorporate NAPA monitoring and reporting into existing mechanisms Awareness Raising and Materials • Compile information on linkages of NAPA outputs to NDS, CCA Policy and Strategy, and pro poverty programmes and projects • Compile information on available tools for vulnerability assessments and their economic implications. • Project planning for climate change adaptation Workshops • Workshops on NAPA mainstreaming • NAPA Linkages with NDS, CCAs, KAP • Vulnerability and economic implication of adaptation projects.
5	Upgrading of Meteorological Services	Purchasing of more met instruments Restoration of unmanned stations Upgrading of communication Inspection Upgrading met staff (outnumbered by five Met Officers) Upgrading climate section (Quality management system) Meteorological Service exposure and increased involvement in climate and climate change international programmes.

6	Agricultural Food Crops Development	Extension services Diversification of agricultural system Setting up and maintaining gene banks and planting materials Promoting/processing agricultural products, and of new cash crops
7	Coral Reef Restoration, Monitoring, and Stock Enhancement	Set up and support a Coral Monitoring Team (CMT). Technical Assistance to assist CMT from the start. Train Fisheries staff and other Ministries staff on the monitoring work. Analysis of available data on coral conditions. Identify possible stress factors and potential mitigation options, including coral transplanting and those addressing ciguatera fish poisoning. Design and set up as pilot projects, marine protected areas and artificial reef sites. Hatcheries and equipment.
8	Upgrading, Restoring, Enhancing resilience of coastal defenses and causeways.	Strengthening rural development planning by an additional project staff. Island small scale project construction team. Upgrading work on seawalls and causeways. Monitoring, documenting and reporting of individual work on seawalls or causeways.
9	Enabling Kiribati effective participation at regional and international forums on climate change.	Effective participation in regional and international meetings on climate change and other related activities. Encourage international support for ratification of the UNFCCC Kyoto Protocol and reduction in greenhouse gas emissions. Explore funding support from the international community for climate change adaptation-related projects.

Table 3: Indicative budget over three years.

Project	**Indicative costs AU$**	**Local annual budget AU$**	**Total NAPA Costs Over 3 yrs**	**Responsible Ministry**
Water Resource Adaptation Project	2,174,500	993,905	3,168,405	MPWU
Simple well improvement	146,000	190,470	336,470	MHMS
Coastal Zone Management for Adaptation	1,312,910	624,370	1,937,280	MELAD, MPWU, MFMRD.
Strengthening Climate Change Information and Monitoring	227,000	90,410	317,410	MELAD
Project Management Institutional Strengthening for NAPA	234,000	85,440	319,440	MFED
Upgrading of Meteorological Services	150,000	342,310	492,310	Kiribati Meteorological Service, MCTTD
Agricultural Food Crops Development	450,000	1,105,230	1,555,230	MELAD
Coral Monitoring, Restoration and Stock Enhancement	499,000	87,750	586,750	MFMRD, MHMS
Upgrading of coastal defenses and causeways	5,102,870	567,880	5,670,750	MISA, MWPU
Enabling Kiribati effective participation at international forums	60,000	45,000	105,000	MFAI,
Total **Add contingency 10%** **Grand total for aid funding supported NAPA AU$15,937,950** **Or US$11,983,421 at 1.33**	**10,356,280**	**4,132,765**	**14,489,045** **1,448,905** **15,937,950.**	

6.2 Rationales, objectives, activities and outputs of the Project Profiles

6.2.1 Water Resource Adaptation Project

Rationales

Water resources on coral atolls are from ground water lenses. These lenses are extremely fragile and in many areas very limited in magnitude. Water lenses are also primary long-term water storage facility for many people. The quality of the lens is dependent on rainfall and the width of the land. From this, it is clearly evident that water resources in Kiribati would be threatened by climate change involving more frequent (shorter with severer impacts) or longer duration droughts and coastal erosion.

Climate change, in the form of more frequent and higher level storm surges also threatens the water resources by over-topping the lenses with sea water. This causes the lens to be contaminated by saline intrusion from the surface. The time needed for a given lens to return to normal is dependent on rainfall, but recovery may require months or even years, completely disrupting social and economic patterns in villages or islands.

Additional to climate related risks to the lenses, risks from domestic sanitation practices can be quite significant. On the other hand, landowners of the lands at which water galleries are maintained to supply urban Tarawa people believe that water withdrawal from the lenses make coconut trees and pandanus trees less healthy and productive.

Communities therefore need to actively assess the status of their water resources, improve and protect them, and increase their quantity and storage.

The objectives are:

1 To maintain and conserve available good ground water lenses;
2. To gain users confidence in the reliability of the distribution system and promote their willingness to pay, based on consumed quantity;
3. To increase water storage and water resources to meet current demands and at times of serious droughts.
4. To manage risks to water resources throughout the atolls. This will be achieved through risk assessments and in designing and implementing responses, including sustainable community-based monitoring system.
5. To assess impacts of urban water supplies on other natural resources, systems and subsistence activities.

Activities

"Demand" pricing system will enable purchase of equipment and the setting up of a system for payment of water based on metered consumption. Improved maintenance of existing water supply system will involve routine and predictable procurement of parts and fittings, as well as continuous repairs. The monitoring of water resources on Tarawa

will be expanded, and the monitoring of water resources on outer islands will start on selected islands and wells. Local communities will be involved in monitoring ground water lenses with the aim to establish and start sustainable community based monitoring system. Awareness raising of the communities about the states of water lenses in their localities, and about the vulnerability of the lenses to environmental risks and domestic sanitation practices are important preconditions for a sustainable community-based monitoring system. Travel costs will be covered. Effects of drought on the water supply operations will be monitored and plans will be developed to provide alternative sources, including desalination.

Outputs

PUB to have equipment to allow them to charge water on user-consumption basis.
PUB to adopt a maintenance program, and to upgrade distribution of water to meet requirements of water charge on user-consumption basis.
WEU to monitor wells on outer islands, and untapped water resources to form components of island vulnerability profiles.
WEU to have feasible plans and implementation requirements for managing drought risks.
Communities are better informed about the states of their water resources and risks.
Communities participation in the monitoring of water resources.
Impacts of urban water supplies on other natural resources, systems and subsistence activities.

6.2.2 Simple well improvement

Rationales

Storm surges cause flooding to surrounding areas of wells that are located close to the shoreline. Heavy rainfall creates runoff flowing into unprotected wells. In addition, regular drawing of water from such wells by means of a container attached to a strong string whilst one stands at the edge of the well creates muddy and wet ground around the wells. Water from these wet grounds visibly drips into the wells. There are many such wells within the villages. Water borne diseases are a concern of the MHMS, particularly such diseases like diarrhea.

Objectives

Reduce the burden of diarrhea and other water related diseases and problems particularly among very young and old people in Kiribati. This will be achieved by improving over the period of three years, 500 ground water wells that are used by the communities for their drinking and cooking.

Activities

Cements, polythene, "Tamana hand pumps", and moulds for wells will be provided. Environmental Health senior officials of the MHMS will introduce the project to each of the outer islands local councils, and work with island based sanitarian aides, water technicians, and the village welfare groups to implement the project.

Improvement will build up concrete lining, parapet, lid, and apron. "Tamana hand pump" will replace the current use of a container dipped into the well. Communities will do all the required work for their wells, under supervision of sanitarian aide and water technician.

The Environmental Health Division will monitor the project and report as well to the CCST on progress. Data base will be set up for this monitoring.

Outputs

500 ground water wells are protected. Monitoring system is established. Regular visits by the Environmental Health Division staff to outer islands support the project.

Incidence of diarrhea illness is reduced.

6.2.3 Coastal Zone Management for Adaptation

Rationales

In the late 1970s and early 1980s most, if not all, Island Councils had included the construction of seawalls to address coastal erosion amongst their rural development projects. Extensive, unabated and progressive coastal erosion has been experienced throughout the Gilbert Group. The social assessment report on the vulnerability of the communities lists "coastal erosion" among the most obvious changes (MacKenzie,2004). During the national consultations under KAP I to identify adaptation coping strategies participants ranked coping strategies related to coastal erosion from 12 to 19. These rankings came after the top priorities which were given to general awareness raising about climate change, and to strategies to cope with the vulnerability of water resources.

In its final ranking, the CCST lowered the national consultation rankings for most of the coping strategies except those strategies that regulate activities that destroy the coastal environment. These coping strategies relate to the need to carry out EIA on any coastal development and the prohibition of reef blasting.

Institutional arrangements to control development on coastal areas exist but they are ineffective.

The objectives of the project are:

1. To improve public awareness of the coastal processes and climate change impacts;
2. To develop and pilot community-based coastal management regime by establishing community groups (essentially villages);
3. To encourage communities to participate in coastal-ecosystem enhancement projects and to develop their own small scale projects with similar purposes;
4. To streamline regulatory controls and conditions so as to ensure the resilience of the coastal areas and to ensure the sustainable use of coastal resources is enhanced.

Activities

Coastal zone management for adaptation has four components: awareness raising; protecting and enhancing resilience of coastal assets; information and data; and institutional strengthening. Awareness raising aims to make and empower the communities to recognize and minimize risks that can arise from climate related hazards and the dynamic nature of the coastal area. Appropriate coastal resilience enhancement project such as mangrove replanting will be initiated with the communities. The communities will also participate in a vulnerability mapping of their respect areas so that they are better informed about aspects of their livelihood that are vulnerable to climate change. In addition local experience will be a major influence on the island vulnerability profiles. Finally, the communities will be mobilized and empowered to be able to manage their own respective areas of the coastal zone.

At a national level the various committees on coastal zone management need to be supported and strengthened, including through review of relevant regulations with the aim to streamline procedural and institutional aspects.

Outputs

Awareness leaflets in Kiribati language, explaining how climate change and extreme weather can affect the shoreline and adjoining land.

Manual outlining CHARM, vulnerability assessment, and adaptation “soft options”.
Radio programmes.

Workshops.

A design of model sea wall (to be done under KAPII).

Expanded, documented mangrove planting.

Pilot groups established to manage their village coastal areas.

Streamlined permitting system for coastal development.

Committees on aspects of coastal zone management function more effectively.

Relevant laws are reviewed, providing information for further coastal use and policy development.

6.2.4 Strengthening Climate Change Information and Monitoring

Rationales

Climate change has far reaching effects on life, land, sea and associated resources. The evaluation of international scientific information on climate change and its implication on Kiribati is important. This information will inform government and the people to adopt appropriate response to climate change issues in the local, regional, and international context. Kiribati considers that IPCC is the authoritative international body to advise on the scientific aspects of climate change and associated issues. The UNFCCC COP and associated processes offer the best forum for international cooperation in addressing the broad range of climate change issues.

The objectives are:

1. To strengthen the capability of the government to be able to keep abreast of, understand and interpret international scientific information relevany to Kiribati;
2. To establish a central office to access and share information on climate change issues from reliable regional and international sources;
3. To develop endogenous scientific capability for analyzing and reviewing information on, and undertaking research related to climate change;
4. To enhance Kiribati capacity to implement its obligations under climate change international agreements.

Activities

The ECD within the MELAD has a small technical unit through which the Ministry has been implementing externally funded projects that are designed to fulfill the objectives of the UNFCCC and other international environment conventions. This unit will monitor information on climate change as provided by IPCC and the UNFCCC processes, assess their relevance for Kiribati, and be responsible for disseminating them to the Climate Change Study Team, and the GOK. In addition the unit will monitor and document climate related risks such storm surges, and to arrange for a review of any climate change related studies in Kiribati. The unit will need technical assistance from time to time.

Outputs

Information from IPCC Assessment Reports will be available to the CCST, and CCST will have the opportunities to discuss them.

Climate related studies in Kiribati will be listed and CCST will be aware of these works.

Climate related risks as they occur will be documented. Visits to affected sites or a sample these sites on South Tarawa, and on outer islands will be necessary. A format of the report will be agreed to by the CCST. Copies of such reports will be sent to the regional organizations and other interested agencies or individuals.

Members of the CCST will increasingly take on these tasks and become more informed on climate change issues.

6.2.5 Project Management Institutional Strengthening for NAPA

Rationales

Climate Change has been recognized in the National Development Strategies (NDS) as a potentially costly risk to national economic growth. This requires a whole of government approach to adaptation. To this end, relevant Ministries have been working on how best to include Climate Change adaptation activities in their Ministries Operational Plans (MOPs) as part of the Kiribati Adaptation Project. The NAPA will incorporate immediate and urgent adaptation needs into relevant Ministries MOPs.

The NAPA will contribute to the momentum of the national efforts to adopt multi-year output budgets and to integrate externally assisted adaptation outputs into the system. It is a learning experience for all Ministries and for this system to work a high competence and commitment is desired. The NEPO is expected to provide guidance and leadership role in driving forward this operational planning system.

The objectives are**:**

1. To operationalize externally assisted adaptation projects through MOPs as part of the whole of government approach to adaptation, and integrate them into the national development planning and budgetary management systems;
2. To initiate a process of integrating climate change consideration into sector policies, strategies and project planning;
3. To gain experience in:
   (a) operationalizing NAPA through MOPs,
   (b) factoring climate change into sector project planning, and
   (c) use lessons learnt when replicating NAPA operational planning in other MEA programmes undertaken in Kiribati;
4. To promote public awareness of linkages and consistency of the NAPA with poverty reduction strategies and other MDGs.

Activities

The Ministry of Finance and Economic Development, through the National Economic Development Office, is responsible for overall national development planning, budget and monitoring. Mainstreaming of externally funded adaptation projects into national policy development and socio economic planning processes are through MOPs. Monitoring and reporting are recently introduced. This is critical for ensuring sustained national efforts with external support, at adaptation.

Ministries will include NAPA activities for which they are responsible in their respective MOPs. NEPO has a major responsibility to provide guidance on the preparation, and monitoring of MOPs. This guidance will be based on current NDS, CCA policy and internationally agreed goals of development efforts. In implementing NAPA activities it will be useful to regularly monitor that they follow the guidance. NAPA activities will therefore enable NEPO to strengthen its role in this area.

Experience that will be gained by the NEPO in taking greater responsibility for operationalizing NAPA activities through MOPs will be useful for other UN environmental conventions. This experience will facilitate the mainstreaming of current and future national programs implementing any of these conventions.

Operational planning has only recently been introduced into the national planning process. Operational planning will be a learning process and this will be facilitated as NEPO and Ministries adopt this planning tool on NAPA activities. In this way the economics of climate change and other environmental issues will begin to be recognized. The requirement that NEPO be exposed to the economics of climate change, adaptation planning, and available tools will reinforce that recognition. NEPO will share this knowledge with other ministries through workshops.

Outputs

NEPO assumes and gets involved in the process of adaptation planning and operationalizing projects such as the NAPA projects.

Adaptation projects such as KAP and NAPA are directed towards pro poverty policies and strategies.

Enhance collaboration between NEPO and Ministries for adaptation planning and operational planning is enhanced.

Awareness raising materials on adaptation planning and its integration into the national development planning process.

Workshops as an awareness raising strategy.

Adequate resources for implementing the MOPs.

6.2.6 Upgrading of Meteorological Services

Rationales

Storms, storm surges and onset of droughts will cause costly climate related risks to economic growth and the subsistence livelihood of the people. The regional and national capability for accurately predicting these extreme weather events, and to publicize early warnings can avoid significant loss and costs to both life and property. This capability depends on real time and accurate weather reports from outer stations timely reaching the National Meteorological Service Office and the Fiji Meteorological Service.

Accurate weather reports form the basis of climate data. This data can be used by research communities and for climate change impact assessment.

The current state of the National Meteorological Services has been in disrepair for a long time with inadequate staff and equipment, particularly for outer observing stations. Eight synoptic weather stations have been identified as permanent reference stations but only four are maintained. Of the stations that are maintained the six hourly interval reporting to the National Meteorological Service is not without problems. The other four have been neglected.

There is a clear need for upgrading Kiribati Meteorological Services.

The objectives are**:**

1. To improve the reliability and scope of weather observation on outer islands, and reporting to the National Meteorological Services;
2. Institutional strengthening of the National Meteorological Services;
3. To foster greater appreciation and use of various meteorological products that are turned out directly or indirectly from outputs of the National Meteorological Services;
4. To increase the National Meteorological Service role in enabling the public and individuals to be able to manage risks from extreme weather events.

Activities

The equipment used for synoptic observation is outdated, and in poor condition. This situation has partly contributed to gaps in the coverage of weather observation of the Gilbert atolls. Weather observations from four outer island stations are sent to the Meteorological headquarters through HF communication system to the Meteorological headquarters. When this fails, weather observations from these stations are sent to the TSKL. TSKL then relays this over phone to the Meteorological headquarters. Both observing equipment and communication system need upgrading.

The number of outer island stations will be increased by establishing 4 automatic stations equipped with communication systems. These stations are more costly than the currently

manned outer station stations, and their costs are included in this project profile for NAPA implementation phase.

Outer island stations and staff need to be regularly visited to boost up their professional morale which is easily dissipated in a dominating sense of timelessness on the outer islands. There will also be specific purposes for these visits such as to install or to check the accuracy of reporting.

The users of meteorological data include researchers and various international programs supporting research on aspects of the climate system. More exposure of the staff to knowledge and information used in these programs will generally raise the standard of professionalism within the Meteorological Service Department.

Outputs

Outer island stations will have new equipment and be fully manned.

Regular tour of outer stations by senior officials of the Meteorological Service Headquaters

Improved quality management of climate data

Meteorological Service is more involved and participating in international programmes on climate and climate change monitoring and predictions.

Meteorological Service assumes greater responsibility for its products and is more responsive to quality and other users' requirements.

6.2.7 Agricultural Food Crops Development

Rationales

Food crop production is known to be critically dependent on the quality and quantity of soil moisture and ground water. Seasonal variability of precipitation, prolonged droughts, more efficient evaporation-transpiration, and occasional seawater over-wash have localized serious impacts on crop production and threatened the very livelihood of the people. These impacts are expected to intensify according to climate change scenarios. The scenarios expect precipitation to increase but variability of precipitation is not featured or accounted for. Furthermore, sea level rise will most likely lead to land erosion, thus decreasing land surface area for storage of water and tree crops.

Food crop production during water stressed conditions is minimal as ground water lenses get dry or turn brackish. These combined impacts on the livelihood of the people would have shortened their life, caused malnutrition particularly among children, and led to greater exertion on the adults in the toil of subsistence lifestyle.

The consumption and production of food crops have declined in recent years. Causes of such decline possibly include urban migration, decreasing size of land for agricultural production, and climate related disasters and seasonal precipitation variability.

The objectives are:

1. To maintain main existing gene banks;
2. To increase and diversify food crop production throughout Kiribati;
3. To make more people attracted to, see economic opportunities in, and engaged in varieties of agricultural systems;
4. To increase efforts at planning out and meeting support requirements for agricultural activities throughout the islands.

Activities

NAPA agricultural activities will be carried out on outer islands and at the headquarters. All activities will be coordinated by the Agricultural Division. Visits to outer islands by a coordinating body at the headquarters, and of field agricultural staff on outer islands to the headquarters will keep the momentum of the activities on going once they are started. This strategy will mitigate the effect on the activities of staff isolation and any tendency to fall into the norm and style of outer island timelessness lifestyle.

Various compost systems for proven cultivatable vegetables and tree crops will be set up and demonstrated for farmers at outer island nurseries. To encourage composite-based farming for home consumption, simple tools will be purchased and disseminated to farmers at prices affordable to them.

Food processing and marketing and new initiatives in these areas will be facilitated and promoted through training in various food processing methods, and in an organized agricultural show.

Gene banks for agricultural crops and other planting materials, particularly for those that are becoming rare, will be maintained at the Headquarters gardens and at each of the outer islands. The gene banks will supply planting materials on outer islands.

Outputs

Feeling of professional isolation by agricultural field officers on outer islands is reduced, and sense of team work among key players is developed.

More people and households will be engaged in agricultural activities for traditional food crops and new cash crops.

Planting materials are readily available at the island's nurseries and regularly supplied where necessary from the gene banks located and managed at the Agricultural Headquarters and other growth centres.

The number of agricultural tools on outer islands will increase.

Accessibility to nutritional food crops will increase and cash income on outer islands from agricultural produce will increase.

6.2.8 Coral Monitoring, Restoration and Stock Enhancement

Rationale

The state of health of coral reefs and coral patches, is adversely sensitive to the increase in sea temperature. Conversely coral reefs are rejuvenated by sea level rise. Coral reefs are intimately associated with the productivity of the subsistence and artisanal fisheries that are the main life supporting activities of the people of Kiribati. Increases of sea temperature and sea level rise are expected to occur as a result of climate change.

Already coral bleaching has been observed among some pristine coral patches, and village communities identify diminishing fish resources as one of the major changes in their environment (McKenzie, 2004). It is therefore important to monitor the conditions of the coral reefs and coral patches in order to have up-to-date information on the extent and trends of any observed bleaching. From this information an explanation of coral bleaching can be developed and appropriate response measures can be designed. For extensively bleached coral patches initiatives may be able to be undertaken to restore their conditions. Certain fish species are depleting, and enhancement program for these will restore their abundance.

The objectives are:

1. To gain more detailed information on observed coral bleaching, including factors causing health problems to the corals and ciguatera fish poisoning;
2. To establish, implement a sustainable monitoring programme to cover two atolls;
3. To pilot a restoration scheme for coral species in areas of low growth; and
4. To establish marine protected areas.
5. To establish a project where stock enhancement contributes in maintaining a vigorous coral reef.

Activities

A core group of trained divers from the Ministries of Fisheries and Marine Resources, and Environment, Lands and Agriculture will be formed with responsibility to establish, monitor, analyse influencing factors on, and project the condition of the coral reefs around selected islands. Particular attention will be paid to coral bleaching and ciguatera poisoning incidences. The group will also develop and implement plans for restoring the health of coral where it is observed to be deteriorating within areas that are considered to be critical for maintaining fisheries productivity. Technical assistance will be required.

Outputs

Baseline data on general conditions of selected sites.

Analysis of first available data and, with existing data carry out trend analysis.

Assessment of causes or stress factors affecting coral health.

Design management response measures such as awareness raising, protected marine areas, artificial reef, and transplanting of corals.

Coral Monitoring Institution formalized and strengthened.

6.2.9 Upgrading of coastal defenses and causeways

Rationales

Various designed seawalls and remnants of those that were destroyed can be found along the shorelines of South Tarawa and outer islands. There does not appear to be a sufficiently strong design and construction against destructive forces of the occasional sudden storms. In all cases these seawalls require regular maintenance against the natural deterioration under the dynamic equilibrium of wind, current, and wave forces at the shoreline.

Causeways joining islands of South Tarawa, and similarly for outer islands were constructed in the 60s and their designs have proven inadequate. They are flooded during exceptionally high spring tides and storms (technically persistent winds of gale force). Causeways on South Tarawa have occasionally been built up, and this will continue to be needed. Causeways on outer islands will similarly require upgrading.

The objectives are:

1. To prevent encroaching coastal erosion from affecting public infrastructure such as roads, airfields and community public assets by upgrading existing seawalls;
2. To improve accessibility within the atolls which has been facilitated by causeways. Accessibility is, in a few cases, threatened by the inadequacy of causeway designs and/or change in the environment;
3. To minimize potential risks to assets from climate-related disasters.

Activities

The local government council will be responsible for upgrading public seawalls and causeways within its area of responsibility. Construction teams will be set up by the council. Technical information for upgrading work will be provided by the WEU through the rural development unit of the MISA. The MISA will be responsible for implementing the project. An officer in rural development unit of the MISA who is a

member of the CCST will assume a major role in the project. An assistant will be required for monitoring and reporting on all coastal upgrading work on existing sea defences and causeways.

Visits by technical personnel of the MISA and MWPU to local councils and work sites will be initiated and maintained. Regular reporting on the types of sea defences at which upgrading works are being carried out, their locations, and general description of the immediate environment will be provided by the MISA through its official representative, to the CCST.

This project will further be monitored through the normal government project management system. Funds made available will form part of the MISA MOPs and the normal reporting requirements to the NEPO will be followed.

Outputs

The design and construction of the seawalls and causeways is improved.

Specific arrangement for the upgrading of causeways and seawalls is initiated.

Causeways are upgraded where there is need, and seawalls protecting infrastructure are upgraded.

Local government councils and communities are involved.

6.2.10 Enabling effective participation at international forums

Rationales

As climate change is a global concern with effects felt at local levels these effects need to be brought out at regional and international forums on climate change so as to guide global responses to climate change. More lately, Kiribati participation at these forums has been at technical ministries level only without representation from Kiribati foreign affairs ministry. The ministry has responsibility with technical ministries for voicing and assessing Kiribati position on major international issues and climate change is among the major issues. Inclusion of MFAI in Kiribati delegation to such forums will ensure effective voicing of information from national circumstances to assist with planning global responses to climate change.

The objectives are:

1. To enhance the effectiveness of conveying climate change related information based on Kiribati national circumstances to regional and international meetings on climate change.
2. To increase Kiribati capability to influence international efforts at mitigating climate change, and at addressing immediate and urgent, and longer term adaptation needs.

Activities

MFAI will more regularly attend regional and international climate change meetings as part of Kiribati delegation. Kiribati delegation to regional and international meetings on climate change will encourage a wider geographical participation in existing climate change related international agreements. Funding support from the international community for climate change adaptation will be essential for adaptation, and MFAI will be able to explore available sources.

Outputs

Ministry of Foreign Affairs is kept abreast of international issues on climate change.

Kiribati develops well coordinated whole of government concern and position based on update information from IPCC, and national circumstances at international meetings on climate change.

Adaptation undertakings in Kiribati proceed without facing barriers arising from lack of information and understanding of available international support mechanisms.

7. NAPA Preparation Process

7.1 Approval of the NAPA Process

During January 2006 a first draft of NAPA, which included some NAPA project profiles, was completed, copies were submitted for review to CCST, and sent to KAP Advisors and MELAD advisors for external review, and for collaborative inputs. The LEG was requested to review the draft as well. Comments from reviewers were discussed by the CCST as they reviewed and approved the draft. A final draft was submitted to the NASC late in August and following its endorsement, the draft was submitted to Cabinet in September 2006.

The NAPA document as noted in the preface by the Hon. Minister of Environment, Land, and Agriculture was adopted by Cabinet on…..

7.2 Establishment of the NAPA Team

In section 5.3 and 7.1 some of the tasks of the NAPA Team, renamed as the CCST, in the NAPA process are noted. The CCST members are technical personnel from various disciplines and sectors such as agriculture, fisheries, water, land and coastal management, energy, education, public health, local government and rural development planning, finance and economic development planning, environment, statistics, and international relations. Their meetings are chaired by a senior official of MELAD, and in his absence the Director ECD. About 20 meetings have been held during the project duration. Secretarial service to the CCST is provided by the NAPA PMO.

The CCST in carrying out its functions had on occasions formed adhoc working teams on specific assignments. For example, adhoc working teams were formed to assess the likelihood of the occurrences of storm surges, the likelihood of sea surface temperature exceeding a threshold for coral bleaching, and the likelihood of drought.

7.3 Kick Off Meeting

The Kick Off Meeting was held on the 23rd September 2004 on South Tarawa, and officially opened by the Permanent Secretary of the MELAD. KAP Coordinator was a facilitator. Sector presentations include these themes: Climate Change and NAPA; National Planning Process and NAPA; Agriculture; Fisheries; Water supplies; and Public Health.

7.4 Adoption of coping strategies and prioritization

The broad criteria adopted and applied during the National Consultations could have been heavily weighted toward self reliance attitude with which participants had to assess

priorities of the various coping strategies. The top priorities were coping strategies that participants felt can be undertaken without any external assistance.

These initial prioritization results were refined by the CCST when they assessed the priorities using specific criteria explained in section 5. The CCST subsequently consolidated the individual results, applied assigned weightings of the criteria, and averaged the results. Additional criteria and weightings were developed for the NAPA and applied in a similar way by the CCST to produce the prioritized coping strategies for the NAPA.

The NAPA criteria are based on those indicated in the NAPA Annotated Guidelines and with the addition of: loss of life; food security; health/disease; settlement area; capital infrastructure; and loss of biodiversity.

Members of the CCST identified projects that are included in this NAPA document, referring to the prioritized coping strategies. The NAPA PMO checked these project profiles against the prioritized coping strategies, and the works under the KAP. Particular attention was given to the Social Experts Report which gives the perceptions of the communities as to the changes of the attributes of their environment which are obviously linked to the climate. These changes adversely affect the people and their livelihood. The NAPA project profiles will enable Kiribati government and people to cope with more immediate and urgent effects of these changes.

7.5 Implementation Strategy

Implementation of each NAPA projects will be the responsibility of the Ministry proposing it; the Ministry will undertake the activities that are listed in the relevant project profiles. The Ministry of Finance and Economic Development Planning will receive funds for the NAPA project, and warrant to each of the proponent Ministries the amounts of funds that are earmarked for their respective projects.

However, NAPA profiles and costs should be programmed to meet expected funds that can be secured from GEF on the condition that there is co-financing, particularly from Kiribati recurrent budget. This should also give flexibility for Kiribati to determine whether it will submit a package program or individual projects. The table below indicates the program to meet the first anticipated grant from LDC Fund GEF.

Table 4: Programmed budget over 3 years

Project	Total NAPA Costs Over 3 yrs	First requested support from GEF	Balance for further request or for local co-financing	Responsible Ministry

Water Resource Adaptation Project	3,168,405	1,310,000	1,858,405	MPWU
Simple well improvement	336,470	336,470	0	MHMS
Coastal Zone Management for Adaptation	1,937,280	1,937,280	0	MELAD, MPWU, MFMRD.
Strengthening Climate Change Information and Monitoring	317,410	317,410	0	MELAD
Project Management Institutional Strengthening for NAPA	319,440	319,440	0	MFED
Upgrading of Meteorological Services	492,310	492,310	0	Kiribati Meteorological Service, MCTTD
Agricultural Food Crops Development	1,555,230	450,000	1,105,230	MELAD
Coral Monitoring, Restoration and Stock Enhancement	586,750	586,750	0	MFMRD, MHMS
Upgrading of coastal defenses and causeways	5,670,750	1,217,870	4,452,880	MISA, MWPU
Enabling Kiribati effective participation at regional and international forums on climate change.	105,000	105,000	0	MFAI,
Total **Contingency 10%** **Total funds requested AU$7,779,780** **Or US$5,849,458**	**14,489,045** **1,448,905**	**7,072,530** **707,253** **7,779,780 or US$5,849,458 at 1.33**		

Each Ministry will incorporate activities of the NAPA projects for which it is responsible and funds are forthcoming, into its Ministry Operational Plan. Monitoring and reporting

on the performances of the NAPA projects are on quarterly basis as for all other activities in the MOPs. At the NEPO a desk officer for the NAPAs will maintain database on the project details such as approved funds, disbursement and expenditure of funds. Physical reports on implementation will be included. NEPO will also be responsible for ensuring that the MOPs realistically describe NAPAs outputs as are intended in the NAPA document. In this regard, the NEPO is expected to provide guidance on the MOPs preparation, its monitoring and reporting requirements.

The CCST will receive reports from each member on the performance and progress of the NAPA activities for which his/her Ministry is responsible. The CCST will support the implementation through MOPs of NAPA activities and have the responsibility as a team for overall performance of the NAPA. Through its chairman, the NASC and the DCC will be kept informed of progress, and at the same time apprised those bodies of any major problems that might be encountered in the implementation of the NAPA activities and do require higher level support.

The Climate Change Unit within the ECD of the MELAD will have a key role in servicing and providing climate change information to the CCST. The ECD has a special interest in comprehending overall performances of all environmental programs, and in this respect the NAPA projects. However, rather than having a strong coordinating role for the NAPAs projects, it is considered best that Ministries quickly assumes direct responsibility for addressing climate change impacts that adversely affect the sectors for which they are responsible. Financial accountability will be as it is assured for other public funds through the national budget, MOPs, and financial control and reporting mechanisms.

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Kiribati NAPA Document Attachment I

Complementary Table on NAPA and KAP II

KAP	Costs (US$m)	NAPA	Costs requested from GEF (AU$)
1. Policy planning and information **1.Frameworks and processes for participation, awareness** **2. National consultation, participation, awareness** • Two yearly consultation in 2006 and 2008 • Regular CCA-based participatory events • Newsletter, media releases, and educational materials • Annual survey of public attitude and awareness. **3. Policy coordination and planning** • Support NSRMU • Development of risk diagnosis and response processes • Support population and resettlement programs • Support NASC and CCST **4. Information for climate risk management,** **5. Climate monitoring system** • Purchase of manual stations • Training to Met office staff on operation of equipments maintenance and data management	0.68	**Enabling Kiribati effective participation at international forums** • Effective participation in regional and international meetings on climate change and other related activities. • Encourage international support for ratification of the UNFCCC Kyoto Protocol and reduction in greenhouse gas emissions. • Explore funding support from the international community for climate change adaptation-related projects.	105,000
		Strengthening Climate Change Information and Monitoring • Compile for CCST key information from IPCC Assessment Reports. • Equipment, computers and soft ware • List studies and data on researches on Kiribati and summarise conclusions • Document risks when they occur • Review of studies Technical assistance	317,410

		Upgrading of Meteorological Services • Automatic Equipments, installation, of all 8 reference stations with now only 4 functioning but with problems. • Some of the stations will have automatic equipment, and additional automatic stations will be established. • Exposure of staff to regional and international meetings on climate change, and training on equipment	492,310
5. Programme/Project Management **5.1 Operation of project management unit within OB** 5.1.1 Project Coordination (and action plan). 5.1.2 Project supervision travel costs 5.1.3 Project accounting and reporting 5.1.4 Procurement 5.1.5 Audits 5.1.6 Office expenses **5.2 Program of activities** • Economic assessments for larger investment packages. **5.3 Review**	0.29	**Project Management Institutional Strengthening for NAPA** • Mainstreaming NAPA • Monitoring and Reporting • Awareness Raising and Materials • Workshops	319,440
3. Freshwater resources **1.Update national water policy, standards and capability to include CCA** • Assist MPWU to develop National Water Policy. (MWPU prog - "Prepare draft National Water Policy document".) • Strengthen capacity in water resources assessment (MWPU prog – "Strengthen capacity of Water Engineering Unit, MPWU in water resources assessment methods & analysis".) • Revision of national building codes. (MWPU prog- "Revise water supply (including rainwater) & sanitation parts	1.31	**Water Resource Adaptation Project** • Development and implementation of "Demand" pricing system for South Tarawa. • Improved Maintenance of existing water supply system. • Improvement on existing wells. • Risk assessment of water resources. • Impact assessment of urban groundwater supply system. • Awareness raising. • Sustainable community	1,310,000

of the Draft National Building Code".) • Development and promotion of guidelines on rainwater. (MPWU prog "Develop rainwater harvesting guidelines & summary tables, and encourage their use"). **2. S.Tarawa water planning, remedial actions and pilot projects** • Assist MPWU/PUB to prepare Master Plan for water in Tarawa. (MPWU prog "Prepare Master Plan for water development on South Tarawa.") • Consumer education and awareness prog. (MPWU prog "Provide other technical assistance to PUB (eg consumer education & awareness, pricing policy for water, monitoring programs)). • Carry out additional freshwater lens assessments on Tarawa. (MPWU "Conduct water resources assessment for 2 islands in North Tarawa and/or Temaiku.") • *Study of artificial island freshwater lens.* (MPWU "Design and implement a feasibility study to 'build' an island in selected North Tarawa location and monitor its development over life of project (and beyond)".) • Leakage detection and rehabilitation of Betio distribution and TUC. (MPWU prog "Conduct leakage detection and rehabilitation of selected locations within the Betio pipe distribution network and household plumbing"). • Install rain water collection/storage facilities at community buildings in South Tarawa (particularly Betio, Bairiki and Bikenibeu. (MPWU "Design and install rainwater collection facilities		based monitoring system. • Planning for Drought, its effect on Operations and Distribution. • Institutional strengthening and capacity building for sustainable water management.	

and tanks at selected government /)" • Pilot project:rainwater collection for recharge. (MPWU prog "Design and implement a pilot project to assess feasibility of using rainwater collected from large buildings to recharge groundwater in open space areas and utilise groundwater for local houses (e.g. Bairiki playing field)".) **3. Outer islands assessment and public and private water system upgrades.**		**Simple well improvement (particularly for outer islands)** • Visits by MHMS to outer islands to introduce the project through village welfare groups. • Regular monitoring visits. • Provide materials for mold for wells.	336,470
2. Land Use, Physical Structures and Ecosystems **2.1 Integrating climate change adaptation into land use policies** • Raise awareness, strengthen regulation and permitting • Monitor environmental and economic impacts of aggregate mining **2.2 Improving protection of public assets** • Develop a systematic risk analysis/design response process and revised design parameters for coastal hazard protection • Improve protection of key public assets at risks. **2.3 Monitoring and sustaining coastal ecosystems** • Coordinate CCA and biodiversity conservation strategies • Monitor coral reefs and other ecosystems affected by CC and adaptation (TAn [1]and equipment). • Pilot investments to support affected ecosystems (Fisheries)	1.52	**Coastal Zone Management and Resilience Enhancement for Adaptation** • Awareness raising • Protecting and enhancing resilience of coastal assets • Information and Data Institutional strengthening of committees.	1,937,280
		Upgrading of coastal defenses and causeways. • Strengthening rural development planning by an additional project staff • Island small scale project construction team Upgrading work on seawalls and causeways.	1,217,870
		Coral Reef Monitoring, Restoration and Stock Enhancement • Set up and support a Coral Monitoring Team (CMT). • Technical Assistance to assist CMT from the start.	586,750

		• Train Fisheries staff and other Ministries staff on the monitoring work. • Analysis of available data on coral conditions • Identify possible stress factors and potential mitigation options, including coral transplanting and those addressing ciguatera fish poisoning. Design and set up as pilot projects, marine protected areas and artificial reef sites.	
4. Capacity at island and community level • Local consultation and participatory risk assessments • Training in local government CCA roles and responses • Include CC vulnerability in OI profiles • Pilot small scale OI adaptation investment scheme.	0.46	**Agricultural Food Crops Development** • Extension services • Diversification of agricultural system • Setting up and maintaining gene banks and planting materials Promoting/processing agricultural products, and of new cash crops	450,000