

NATIONAL CAPACITY SELF ASSESSMENT PROJECT
THEMATIC AREA RELATING TO CAPACITY NEEDS
TO IMPLEMENT

THE UNITED NATIONS FRAMEWORK CONVENTION ON
CLIMATE CHANGE

PREPARED FOR THE PROJECT MANAGEMENT

BY

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WORK ALREADY DONE

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Abbreviations

WB	World Bank
SPREP	South Pacific Regional Environment Programme
KAP	Kiribati Adaptation Project
CCST	Climate Change Study Team
NASC	National Adaptation Steering Committee
KANGO	Kiribati Association of Non-Governmental Organizations
CCU	Climate Change Unit
PMU	Project Management Unit
UNFCCC	United Nations Framework Convention on Climate Change
UNCBD	United Nations Convention on Biodiversity
UNCCD	United Nations Convention to Combat Desertification
MCTTD	Ministry of Communication, Transport and Tourism Development
MEYS	Ministry of Education, Youth and Sport
MELAD	Ministry of Environment, Land and Agriculture Development
ECD	Environment and Conservation Division
MFMRD	Ministry of Fisheries and Marine Resource Development
OB	Office of the Beretitenti
UNDP	United Nations Development Programme
GDP	Gross Domestic Products
GEF	Global Environment Facility
NAPA	National Adaptation Programme of Action
KMS	Kiribati Meteorological Services
SCOPIIC	Seasonal Climate Outlooks for Pacific Island Countries

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A number of institutions, and individuals in their official or private capacities have provided useful information to enable a start on the assessment of national capacities to be able to implement relevant provisions of the UNFCCC. The information are used to complete the assessment and in finalizing this report.

Ministries and Divisions that have provided information are the Meteorological Division of MCTTD, Lands Management Division of MELAD, Curriculum Division of MEYS, Mineral Division of MFMRD, Kiribati Adaptation Project (KAP) in the OB, and the Environment and Conservation Division of the MELAD.

Representatives from other stakeholder institutions participated in at least one of the consultation workshops conducted for the project. These institutions include various Churches, KANGO, Chambers of Commerce, Betio Fishermen's Association, and two Local Government Councils on South Tarawa. Contributions from these institutions to the identification of issues during the workshops are acknowledged.

Our thanks goes to all the institutions and individuals who have provided information needed in the undertaking of the assessment and to complete this report.

Our involvement in NCSA as local consultants for the thematic area of climate change has been a privilege for which we are thankful. We have learned from the workshops and from the PMU and SPREP expert. For this privilege, we are indeed grateful to Tererei Abete-Reema, Director of the Environment and Conservation Division; Kautu Temakei who is the Project Coordinator, and Frank Wickam of SPREP.

Executive Summary

Kiribati ratified the UNFCCC in February 1995, and therefore has obligations to implement the Convention.

Obligations cover a wide scope of issues that have mixed facets from environmental, social and economic considerations. These are of the sustainable development pillars at a macro-level perspective, and can be seen as being supported by any climate change issues based on the provisions of the UNFCCC.

In 2005, the population is about 95,000, it is increasing at a rate between 1.7 and 2.2 over the past census years, and about 44% are in Urban Tarawa.

GDP has fluctuated, dominated by the public sector, but government expenditure far exceeds exports, and national income per capita is much higher than would be expected from GDP, reflecting the level of external assistance to Kiribati. In all measures Kiribati is clearly a least developed country.

Environmental vulnerability of Kiribati to climate change and sea level rise is obvious from its geophysical characteristics- flat, and narrow coral islands.

The approach in the NCSA is firstly a stock taking involving the gathering and analysis of available information on climate change activities, and consulting ministries and other stakeholders about any such activities. This information, and the knowledge of participants were the basis of analysis in the national workshops designed to come up with environmental problems that are caused by climate change, and capacity gaps that will require remedial assistance of the NCSA.

Environmental problems that are associated with climate change have their root causes in capacity gaps to be able to address such problems. The root causes therefore denote capacity gaps.

The log frame tool was used in identifying the root causes. A final step that we adopt is linking these problems and root causes to any of the four broad groupings of climate change issues- science, vulnerability, adaptation, and mitigation. It is found that each of the issues can be linked to least one of these groupings, and the UNFCCC covers well these groupings. We found that they indeed apply to all the groupings.

A prioritization method of the problems/issues is suggested, and this method is followed through. They are firstly prioritized on the basis of their relevance to the climate change broad groupings of issues, together with their relevance to the other two Conventions. This is shown in Table 6.1. Secondly, the issues are prioritized on the basis of how appropriate that each of the root causes has contributed to each of the issues (Table 6.2). Table 6.3 shows the two different orders of priority of the issues under the two sets of criteria. The results are combined in Table 6.4, suggesting an order of priorities as “low ground water availability”, “loss of biodiversity”, and “coastal erosion” etc.

Table 6.2 shows the priorities of the environmental problems/issues on the basis of how appropriate that each of the root causes has contributed to each of the issues. At the same time this Table indicates the priorities of the root causes on the basis of their relevance to

each of the environmental issues. The order of priority of the root causes are “insufficient data”, then “insufficient funds”, “insufficient human resources”, etc.

Capacity needs should relate to individual, institutional, and/or systemic levels. In general capacity needs that are identified apply across all the different levels. A particular capacity need may however have its main thrust at a particular level, but in a supporting role the capacities at other levels must also be enhanced. An example is “lack of legislation” which has its main thrust at the systemic level, yet it is easily seen to be relevant as well at the individual level - leaders of the communities and stakeholder groups must be consulted and knowledgeable about laws, and at the institutional level - Ministries and Divisions will implement any new law.

1. Background

1.1 Introduction

Kiribati NCSA activities are part of the regional project implemented by SPREP. As are applicable to Kiribati, the NCSA objectives are:

- 1 Identify priority issues for action within the thematic areas of climate change, biodiversity, and land degradation;
- 2 Assess capacity needs of Kiribati *within and across* the thematic areas so as to be able to address the issues; and
- 3 Link actions addressing the issues to broader environmental management and sustainable development frameworks, that is, mainstreaming.

This report is on the thematic area of climate change. The scope of issues within the thematic area of climate change could be any collection of issues as long as each of the issues directly relates to what Kiribati is required to do under the UNFCCC but Kiribati is unable to do them adequately from lack of national capacity. In Kiribati the ECD is managing and undertaking the necessary activities of the Project.

Likewise, issues generated within each of the other two thematic areas relate to what Kiribati is required to do under the relevant conventions, the UNCBD and the UNCCD. Unlike uninterrupted work on the two thematic areas, UNCCD and UNCBD, work on the UNFCCC was undertaken in two blocks. Attempt is made in the second block to maintain continuity of the tasks that were already started during the first block.

Stocktaking and identification of environmental problems/issues arising from climate change, including through national consultations, had involved closely Teibiroa Kouramaere as local consultant. Subsequent national consultations, analysis of the problems/issues, root causes, and the write up of this report has involved another local consultant.

The work that had been completed by Teibiroa Kouramaere are incorporated here and are used in this report.

1.2 National Circumstances

Kiribati is a least developed country, and a small island developing state. These two categories are recognized under the UNFCCC as having special needs related to the implementation of the Convention. This recognition bears out the reality that a country's capability to implement the Convention depends on its level of economic development and on the robustness of its geo-biophysical formation. Kiribati is considered disadvantaged on both considerations.

Kiribati's estimated population in 2005 was about 95,000 and 44% of these people live in the urban part of Tarawa atoll. Population censuses over several 5 year intercensal periods indicate annual rates of growth between 1.7 and 2.2. There is no indication that population is to stabilize in the foreseeable future.

GDP over the years has also fluctuated and is largely dominated by the public sector. About 80% of employment is from the public sector. The private sector is small but is growing and dynamic.

Government expenditures over the last decade exceeded annual GDP by about 13%, on average. Imports far exceed exports. National income per capita is much higher than would be expected from GDP, reflecting the level of external assistance to Kiribati.

Agricultural productivity is limited. The coconut tree is the only cash crop, which produces copra for export. Recently, coconut oil is also being extracted to provide another export commodity. Marine resources are tuna fisheries exploited by foreign fishing on payment of licensing fees, ornamental fish exported by local entrepreneurs, and seaweed farmed on few islands for export.

The limited natural resources are sensitive to the nature of the prevailing weather and climate, which varies on seasonal and inter-annual basis. Years of high precipitation are generally associated with good copra production and tuna abundance. The tuna abundance attracts foreign fishing activities and the fees charged for fishing licenses contribute to the GDP. However, in all seasons export copra price is generally low, and foreign fishing nations are reluctant to pay higher licensing fees.

The above facts explain the economic dependency of Kiribati on the global economy and on development partner countries. Kiribati economic situation means that Kiribati is unable to divert any resources to meet incremental costs of climate change impacting on its natural environment and economy.

Kiribati's poor economic prospects are not unexpected when viewed in light of its geophysical characteristics. Kiribati consists of atolls scattered in three groups within a vast area of the Central Pacific ocean. The total sea surface area that makes up the EEZ is 3.5 million km², compared to a total land area of only 800 km². The land area is distributed unequally among 33 atolls existing within a region defined by 5° N and 7° S latitudes, and 168° E and 168° W longitudes. The Gilbert Group in the west has 17 atolls; the Line Group in the east has 8 atolls; and the Phoenix Group of 8 atolls lies in between. Five of the atolls in the Line Group and 7 in Phoenix Group are uninhabitable. The three groups have disjointed Exclusive Economic Zone (EEZ) with regimes of high seas separating them.

The atolls are small, narrow, flat land pieces. They are about 600 m wide on average, and are about 3 to 4 meters above mean sea level. During high spring tides, or during winds with gale forces, the edges of the atolls are usually flooded from the surrounding seawater. The occurrence of flooding depends on wind and atmospheric pressure that characterizes the weather at the time. These elements of the weather have impacts on the natural state of the sea level and cause the sea to overtop and flood the edges of the islands.

The driving force of the weather is temperature distribution. It is understood that global temperature has increased since the 19th century, as would be expected from human-induced climate change arising from emissions of greenhouse gases. Global temperature increase is expected to cause the sea level to rise, and this has also been observed. IPCC Fourth Assessment Report advised of the unequivocal happening of climate change and

its projection of sea level is threatening to Kiribati.

Sea level rise has been a major concern for Kiribati. This should be apparent from the above description of the geophysical characteristics of Kiribati. Sea level rise and temperature increase will set in train causal-effect relationships in components of the environment and sectors of the economy, leading to adverse impacts on the livelihood of the people.

From that understanding, Kiribati signed and became a party to the UNFCCC while placing its hope in international actions envisaged under the Convention for addressing climate change. This is not ignoring that Kiribati must carry out its obligations under the Convention which are intended to minimize impacts of climate change that would otherwise be experienced. For Kiribati to be able to do this, external assistance is needed.

It will enable Kiribati to consolidate its needs for capacity building, enabling it to define the risks of climate change to economic and social development, and to the environment. Kiribati needs to be able to identify and implement adaptation measures. It also needs to extent possible mitigate climate change. Capacity needs in such areas will contribute to achieving national development goals, and towards the ultimate aim of the UNFCCC.

Kiribati has now the opportunity through the NCSA to identify its capacity needs to enable it to implement the Convention. The assessment of capacity needs is based on identified root causes of environmental problems/issues to which climate change has contributed. The root causes are consistent with relevant obligations of Kiribati under the UNFCCC.

2. Approach and Methodology

The NCSA Project documents provide guidelines on how to conduct a country driven assessment of its capacity needs. But the guidelines would be of little use, had not there been support and training provided by the SPREP support unit for the project.

The Assessment as it is carried out in Kiribati is in stages.

Personnel were firstly recruited to constitute the Project Management Unit, housed within the ECD Office. They are a Coordinator, and an Assistant. Subsequently, three local consultants are mobilised; each is assigned to one of the three Conventions to assess capacity needs for implementing it. One of the consultants deals with the UNFCCC.

Stocktaking is the first task of the consultants. This has involved consultations with relevant stakeholders, and Ministries and Divisions on their work connected with the provisions of the Conventions. In addition, few relevant documents are provided by Ministries and Divisions to the consultants.

Moreover, the Coordinator makes his office available as a clearing house to the consultants, and some meetings are arranged for the consultants to present their progress report and to get feedback from the PMU. The Coordinator also provides to the consultants all information on the NCSA that he has obtained on the project.

Further assistance to the consultants is in the form of several national workshops that are

held to make stakeholders aware of the projects during its inception, and participate at such times in the course of the life of the project. The workshops enable the consultants to present their work in progress, participants who represent various interest groups to provide feedback, and for the PMU and resource personnel to provide technical guidance.

At some of the national workshops, a principal staff of the SPREP Support Unit for the Project attended. He offers training on project management.

Participants and consultants are very appreciative of their exposure to some tools used in project planning such as LOGFRAME, and showed enthusiasm in using the tool to come up with the capacity needs, issues, and actions.

The tool is most fitting to an approach agreed during the very first national workshop. The approach is that environmental issues and problems are to be firstly identified and based on these, root causes that require capacity needs to be able to address them. Whilst carrying out this stage in the process, participants are not to lose sight of the targeted levels for capacity needs. They are: systems, institutions, and individual actors.

A final output from the consultants is a report as this one, providing synthesis and analysis of the identified environmental problems/issues, their root causes, and linkages to climate change, as well as to the other thematic areas.

3. Stocktaking

3.1 Introduction

Initial work on stocktaking was undertaken by the first consultant. Supplementing information gathered in the initial work, are institutional information of the Climate Change Unit of the ECD, and relevant information from reports and documents. These constitute the whole process of stocktaking. The different information collected in the process are presented below.

3.2 Assessment of the past climate change activities

The Kiribati government first became aware of climate change and sea level rise in the early 1990's, and requested scientific advice on whether there was any real cause for concern about sea level rise. The earliest studies could not provide information in that regard, but they were useful in making the Kiribati government more aware and knowledgeable about its geophysical environment and ecosystems, and sea level changes over the geological time span.

Subsequently but still during the early 1990s, more detailed studies were undertaken. A study area on a small island in Tarawa suggested certain areas to be liable to flooding from storm surges (Tererei Abete1993). This has been vindicated during storm surges in the 2000s. A study of Kiritimati island, which is the largest atoll in Kiribati and indeed in the world, indicated that the land had been rising (Woodroffe et al.1998). These studies, however, did not provide or take into account any sea level rise scenarios.

The first climate change project undertaken by Kiribati government is the US funded Climate Change In Country Studies. Key outputs of the project included—

- 1 Institutional strengthening for climate change planning within the Environment and Conservation Division,
- 2 The setting up of a Climate Change Study Team,
- 3 Capacity building in understanding important resources such as the fresh ground water lens,
- 4 Analysis of local climate data for comparison with global situation as given in IPCC Assessment Reports, and
- 5 Incentives for officials to make efforts to understand certain IPCC Technical Reports.

With regard to this last output, the first attempt at constructing an inventory of greenhouse gases was constructed for the year 1990 (Ministry of Environment and Social Welfare and Ministry of Works and Energy 1997).

Members of the Climate Change Study Team included representatives of key sectors such as meteorological services, water, land management, mineral resources, fisheries, public health, agriculture, energy, economic planning, and education. The private sector was represented by the USP Kiribati Centre. It was chaired by the most senior official of the Environment and Conservation Division, with a project coordinator being a member.

Capacity building continued under the Pacific Islands Climate Change Assistance Programme (PICCAP). Under this programme, the Climate Change Study Team had a more focused agenda of preparing an Initial National Communication. Training modules on Vulnerability and Adaptation assessment became available from regional universities (Waikato University and the USP) which were attended by Kiribati nationals. A greenhouse gas inventory for 1994 was attempted and was included in Kiribati Initial National Communication.

After the completion of the PICCAP the Climate Change Study Team was temporarily inactive. However, the team was revived under the NAPA and KAP I projects. The NAPA and KAP I activities envisaged two committees for their management: the first is to provide policy direction for the projects, and the second to act as a technical committee. An Adaptation Steering Committee was formalized to give policy directions for the two projects, whilst the CCST deal with the technical works of the projects.

Due to a NAPA initiative, international advisors for the KAP were able to provide current climate tools for generating climate change scenarios. These scenarios were adopted in the Climate Change Adaptation Policy and Strategy that Cabinet approved. Prioritization criteria for NAPA proposed activities were also developed with the guidance of the advisors. In this way activities of the two projects were able to be harmonized.

3.3 New studies and areas of work reflecting on gaps

A coastal vulnerability study of parts of Tarawa atoll was undertaken (Taeuea et al. 2000), after the Initial National Communication was completed. The results of these studies were used by the WB consultants to evaluate economic costs expected from flooding and erosion of the coastal areas. The economic evaluation further assessed the anticipated losses from freshwater reduction, and from tuna fisheries that might migrate further north (WB 2000).

Under KAP I seven studies were commissioned and carried out. These included studies on land acquisition for settlement, strategic environment assessment, coastal zone vulnerability, water resources investment, outer island manual for accessing funds for small projects, legislation review, vulnerability social assessment, and an economic evaluation of key adaptation options. These studies have guided, in addition to national consultations, the development of KAP II. They are available on request at the KAP Office.

NAPA acquired data from the South Pacific Sea Level and Climate Monitoring Project on sea level and wind for Betio for the years 1992 to 2004. The data was incomplete, however analysis of the data by the Climate Change Unit (CCU) of the ECD indicated that the residual sea level has risen by 4.9 mm/year, whereas the adjusted residual sea level rose by 2.5 mm/yr. Almost concurrently, the CCU received a Country Report on Kiribati sea level prepared for AusAID by the SEAFRAME Project. This report indicated a rise of 5 mm/yr over the past years for which there are data. Other climate data need further analysis.

ECD staff have benefited from regional trainings on various tools for assessing and planning for climate change impacts. In connection with the ADB consultancy on mainstreaming environmental concerns, a two day workshop was conducted for CCST members on climate change scenario generation based on past trends and incorporating global scenarios. Many members of the CCST and ECD staff attended a more recent training on the science of climate change and available tools and information on climate prediction and mainstreaming.

Efforts have been made to strengthen the meteorological services. Through an Australian regional project, the Meteorological Division has been strengthened in its capacity to issue climate predictions. This has now started, and it has been predicting dry conditions for the latter part of 2007 and early part of 2008. More stations will be upgraded through KAP II and these will be supplemented by NAPA.

Apart from new studies and areas that are directly initiated from a climate-focused interest, there are other studies on related areas that can benefit a more holistic understanding of climate. These studies were carried out as parts of activities of several environmental projects:

- 1 The National Biodiversity Strategic Action Program has documented the state of biological resources in Kiribati and assessed traditional uses.
- 2 Certain types of long-lived pollutants and their locations were identified under the Persistent Organic Pollutant project. Efforts are being made to ship them to a country that can handle them safely.
- 3 The International Waters Program for Kiribati has developed a commercial

operation to collect and export recyclable tins and bottles, and initiated the use of “banana circles” for garden wastes.

- 4 Another project is addressing the problem of large chunks of unserviceable road vehicles that are scattered along South Tarawa. These chunks are collected to one location for shipment to an overseas dealer.

The activities explained above that deal with waste management are addressing a major problem experienced in South Tarawa. Urbanization of South Tarawa continues to grow, and places enormous stress on existing essential services and natural resources. High density areas characterized by substandard housing with inadequate sanitation facilities cover a significant area of South Tarawa. This is a challenge being addressed by the government through plans of decentralization – another hospital on one outer island, a programmed settlement of more areas on Kiritimati Island, and a town plan of government reclaimed land at Temaiku on South Tarawa.

Indications of the degradation of the environment and natural resources on parts of South Tarawa are quite alarming in some cases – the ground water resources are polluted, and overfishing of lagoon fisheries is apparent. The current climate-related risks such as coastal erosion and coastal sea water flooding on one hand, and the developmental and basic needs of an increasing population on the other, create difficulties for environmental management and for conserving natural resources. Adaptation measures which protect the shoreline and ground water resources, and nurture the productivity of agriculture and fisheries facilitate environmental management. These four areas of concern are important for subsistence livelihood, and are therefore seen as critical for poverty reduction.

The strengthening of regulatory measures for the management and conservation of the environment is recognized as a form of adaptation. With this in mind, the Kiribati government has strengthened the Environment Act of 1999 in a superseding Act. In addition, there are a number of other pieces of legislation which have implications for environmental management. It will be useful to have a more detailed review of these legislations with a view to harmonize their effects for more effective environmental management.

Under KAP II some studies have been identified to assist in adaptation. A water resource assessment on some islands will be undertaken, but not all islands will be covered. NAPA will cover monitoring systems of water on selected islands, including extended monitoring of South Tarawa’s water system. Ways of recovering quality of ground water from polluted sources in populated areas need to be explored.

The Second National Communication is about to start. It will seek to provide more update information on how Kiribati has been implementing the UNFCCC. Activities include updating information on the national circumstances (social and economic development and the environment), the 1994 GHG Inventory and mitigation measures, and on adaptation. Efforts will be made to institutionalize and mainstream into government establishments works that are necessary for continuing work for UNFCCC reporting. Important in these efforts will be the attempts to be made to collect relevant data and set up data management system in the ECD that can meet the continuing need for establishing and updating baseline scenarios, monitoring the environment, and

developing strategic policies and programmes for adaptation, and mitigating climate change. Designing, setting up, and maintaining environment data system is a multidisciplinary undertaking and require experts and the support of many stakeholders.

4. Stakeholders and Consultations

Members of the Climate Change Study Team are from Ministries and Divisions whose areas of responsibilities are more directly related to climate change issues. Such issues are the vulnerability of ecosystems, adaptation to risks of climate change, and mitigation of climate change. As noted above, they are as follows:

- 1 Kiribati Meteorological Services (KMS),
- 2 water,
- 3 land management,
- 4 mineral resources,
- 5 fisheries,
- 6 public health,
- 7 agriculture,
- 8 energy,
- 9 economic planning, and
- 10 education,
- 11 USP, and
- 12 ECD

Rural Development Section of the Local Government of the MISA, and Foreign Affairs are also represented on the CCST.

Other stakeholders are entities which are represented in the membership of the Adaptation Steering Committee (ASC) for KAP II but not in the CCST. The ASC is chaired by a Permanent Secretary in the OB, but on several occasions the meetings have been chaired by other members of the ASC in the absence of the Permanent Secretary. Other entities which are not represented on the CCST are the Kiribati Association of Non-Governmental Organizations (KANGO), Kiribati Chamber of Commerce, and Kiribati National Council of Churches (KNCC). They are also stakeholders for capacity building to enable Kiribati to implement the UNFCCC.

At an Inception Workshop on the Second National Communication held in November 2007, a suggestion was made to include on the CCST a representative from each of the two Local Government Councils on South Tarawa, and from the KNCC. The two Councils are also stakeholders in view of their role as providers of some basic services such as rubbish collection for South Tarawa, and further as they claim are more close to the people with their everyday business of earning in their basic livelihood.

No doubt, the whole of the government and the people with their institutions are stakeholders. Memberships of the CCST and ASC have to be limited. But from their networking with their colleagues and associates within systems and institutions in which they are actors, the participation of members of the CCST and ASC in NCSA process and other climate change projects for that matter ensures broad representatives of views within the whole of government and the people.

The national workshops and consultations under the NCSA have involved most of the stakeholders but all were invited. In addition, a number of key representatives of the stakeholders have had discussions with the local consultants.

Public awareness and some mechanisms to communicate on timely basis climate and climate change information to the general public are much desired. Attempts have been made but not on a continual basis and without well designed approach and clarity on target audiences, and contents. This appears desirable and more meaningfully so for members of the CCST and ASC.

There are other committees within the MELAD that are project based in the same way as the CCST and ASC are, or for other persistent areas of concern for environmental or land management. They are also stakeholders and have participated in the NCSA process through the fact that the NCSA is the responsibility of the same ministry, MELAD. This institutional arrangement whereby technical and higher level committees are separate for different areas of concern are as seen by the MELAD in need of streamlining.

Within the region, SPREP and other regional organizations, and development partner countries- Australia and New Zealand - have provided assistance to enable Kiribati implementing the UNFCCC. At the Pacific Rim, Japan and the United States had made their contributions towards the same purpose.

International aid agencies and more far distant countries that have contributed to Kiribati planning for adaptation are the GEF, UNDP, WB, and the EU.

At this stage of the NCSA process, external stakeholders have not been consulted for their views on what needs does Kiribati has for capacity building to implement the UNFCCC. They will no doubt be involved in deciding what assistance they may offer to address such needs.

These countries and international agencies need to be kept informed as to the progress of agreed project activities for which they provide their full costs or contribute to the same. Cooperation and partnership arrangements between international and national experts in the undertaking of technical work of implementing the UNFCCC has started in the KAP I and KAP II. The experts are also stakeholders.

5. Environmental Priority Issues and the UNFCCC

5.1 Environmental issues with reference to institutional and systemic levels

Economic Growth, Equipping people to manage change, and Sustainable Use of Physical Resources are among the 6 Key Policy Areas of the National Development Strategies 2004-2007. Environmental issues are clearly referenced in these Key Policy Areas. These issues include climate change potential costs to economic growth, social and economic impact of climate change, threat to public health from unsafe urban sanitation systems in densely-populated areas, and public spaces are the worst kept in the Pacific.

Climate change issues will embrace steps taken to prepare for adaptation, and efforts in

this direction will lead to interests in other environmental issues, but which are also implicit in the NDS2004-2007 Policy Areas. For example, vulnerability of the ground water resource to climate change leads to recognition of the unsafe urban sanitation systems and of the problems in solid waste management.

Environmental issues are also alluded to in the Environment Act 1999 and the range is further extended in a superseding new Act now to be enforced and implemented. The thrusts of the Acts are on protecting the environment from adverse impacts of development, wastes and pollution; enhancing the sustainability and diversity of the biomes, and ecosystems; and, implementing International Agreements to which Kiribati is a party.

These Agreements are shown in the Table below.

Table 5.1 International and regional environmental agreements

<i>Titles of the Convention</i>	<i>Dates of ratification by Kiribati.</i>
United Nations Framework Convention on Climate Change (UNFCCC).	7 th February 1995
Kyoto Protocol	7 September, 2000
<i>United Nations Convention to Combat Desertification</i>	July 1998
United Nations Convention on Biological Diversity	16 th August 1994
Vienna Convention for the Protection of the Ozone Layer	7 th Jan 1993
Montreal Protocol on Substances that Deplete the Ozone Layer -	7 th Jan 1993
Convention on the Prevention of Marine Pollution by Dumping Wastes and Other Matter	12 th May 1982
Convention for the Prohibition of Fishing with Long Drift Nets in the South Pacific -	13 th Feb 1990 (signed), 10 th Jan 1992 (ratification)
Niue Treaty on Cooperation in Fisheries Surveillance and Law Enforcement in the South Pacific Region	11 May 1993 (signed), 30 th October 1994 (ratification);
Nauru Agreement concerning Cooperation in the Management of Fisheries of Common Concern	11 th February 1982 (signed), 27 th April 1982 (ratification);
South Pacific Forum Fisheries Convention	(July 1979)

United Nations Convention on the Law of the Sea	10 th December 2002
Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (Basel) 1989	September 2000 (ratification).
Convention to Ban the Importation into the Forum Island Countries of Hazardous and Radioactive Wastes and to Control the Transboundary Movement and Management of Hazardous Wastes within the South Pacific Region (Waigani Convention 1995)	16 th September 1995 (signed).
South Pacific Nuclear Free Zone Treaty	6 th August 1985 (signed), 28 th October 1986 (ratification);
Comprehensive Nuclear Test Ban Treaty	September 2000 (signed).
Convention for the Protection of the Natural Resources and Environment of the South Pacific Region (XXX).	
Agreement Establishing SPREP	16 th June 1993

Environmental issues and analysis of root causes lead to a realization of the enormous responsibility and the tasks of environmental management, when taking also into consideration the fragmentation of the islands. Prioritization of the issues is required.

This prioritization in some ways has been done in a number of official documents. The State of the Environment Report covering two periods, 2000-2002 and 2003-2005, is being prepared and has identified key problem areas as coastal erosion, energy, wastes, sewerage, and climate change. Biodiversity is however, the main thrust of the assessment of the State of the Environment; the state of biodiversity is good indicator of the degree of sustainability of the environment. National Consultations in the formulation of the NAPA and KAP II have identified coastal erosion, water resources among others as of high priority for attention.

5.2 Environmental issues as identified in the NCSA process

The process of identifying environmental problems/issues and their root causes are preparatory work for a project proposal for the NCSA implementation phase.

Participants of the national workshop in late 2006 constructed a problem tree for environmental problems that were obvious to them to be related to the effects of climate change. Root causes were also identified.

The consultants, from their situation analysis, synthesized these problems and root causes and presented these to a workshop in late 2007 for more discussion. At this workshop, participants had instructions on log frame tool and its use in planning; they then adopted this in reviewing the issues and root causes.

The workshops recognized and articulated an undesirable situation brought about by climate change. It is that “***Kiribati is very vulnerable to the impacts of climate change and have an insufficient capacity to implement mitigation (and adaptation) measures***”. The bracketed is our insertion.

As were identified by the 2006 workshops the impacts of climate change, in other words the environmental issues are: loss of biodiversity; loss of livelihood; coastal erosion; salt water intrusion; low ground water availability; coral bleaching; loss of production due to drought; increase costs of fossil fuel; oil supplies crises; loss of culture and identity, loss of land; destruction of infrastructure; migration; increase in water borne diseases; and vulnerability to weather extremes. All these issues are consistent with the environmental issues of the NDS2004-2007 namely: climate change potential costs to economic growth, social and economic impact of climate change, threat to public health from unsafe urban sanitation systems in densely-populated areas, and public spaces are the worst kept in the Pacific.

It is from viewing climate change both in the finality of its tendency, and by its progressive intensity that the workshops seemed to have identified the impacts. So we

have in the first category loss of culture and identity, migration, loss of livelihood, and for the second category we may consider increase costs of fossil fuel, coral bleaching, and increase in water borne diseases.

In this report we suggested that all the impacts should be taken to indicate a progression in the state of the substance of the impact from what it is like at some point in time in the past or now, to a degraded state at any point of time in the future. For each impacts there is a threshold when it is irreversible, that is exorbitant costs will be required for a rehabilitation or adaptation. If climate change progresses without any check, the assumption is that most impacts will reach their thresholds, and that is then when the ultimate impacts would become a sad reality for Kiribati. Migration of the people would have been started and completed, human livelihood in Kiribati would have earlier on proved impossible, and Kiribati culture and identity would have extinct in its natural setting.

Impacts then that will require attention are those that are progressing in degrading the environment and/or increasing economic costs to the economy through the increasing destructive effects on the physical assets.

For the environment, the impacts of climate change are decreasing biodiversity and an incidence of this is the observed coral bleaching. This is a direct effect of climate change on one incidence (coral communities) of biodiversity. Other incidences of decreasing biodiversity could be explained in a chain of causes and effects starting from climate change. Decreasing biodiversity could be explained for example by global warming causing sea level rise which then causes erosion of land which results in decreasing biodiversity on the coast. Another example is that coastal erosion could lead to “low ground water availability” which leads to decreasing terrestrial biodiversity. These interactions of the effects of climate change are recognized at the workshop, but they were not examined. As noted above the effects or impacts were noted and noted further that they all lead to ***“Kiribati is very vulnerable to the impacts of climate change and have an insufficient capacity to implement mitigation (and adaptation) measures”***.

Biodiversity is a means of livelihood, and loss of biodiversity is a loss of livelihood. For this reason the loss of biodiversity of which coral bleaching is an incidence may be taken as a measure of the timing of the approaching teleological effects – “loss of livelihood” and “loss of culture and identity”. Whilst decreasing biodiversity is progressive and depends on other effects such as for example coastal erosion, these independent effects can reach their own thresholds and hasten the “loss of livelihood” and “loss of culture and identity”.

Ideally we should know thresholds for most impacts. A threshold of impact on ground water lens may be determined by a combination of rainfall and width of the land. For the latter it is known that ground water lens will not exist for land less than 300 meters wide.

All effects need therefore to be monitored and proactive response measures undertaken. But among the effects, the most relevant and comprehensive effects of climate change is on the state of biodiversity, or loss of biodiversity. It is most relevant too (as biodiversity degenerates) for judging the long-term sustainability of the livelihood and culture and identity, and of their contributions (as livelihood increasingly impoverished) to voluntary or forced migration.

Among the identified effects are those that are economic, such as loss of production due to drought; increasing costs of fossil fuel; and, oil supplies crises. These will be additional to the environmental effects but together they determine the sustainability of the livelihood and culture and identity, and their contributions to voluntary or forced migration.

5.3 Kiribati response to climate change effects is through addressing root causes

The environmental problems/issues are considered as effects of climate change. The NCSA approach is to identify root causes of these effects. Underlying all root causes are the geophysical nature of the atolls themselves, and the least developed economic circumstance of Kiribati. The workshops identified at least 13 root causes which relate to environmental and the economic context of Kiribati. Additional contributing factors to the causes were identified. There are common factors or more frequent factors that contribute to most of the root causes.

The root causes and contributing factors to these causes are detailed in the PMU documents “Problem Tree for Climate Change”. This document forms the basis of the presentation on the progress of work of the consultant to the workshop held in November, 2007.

The additional issues were identified and presented at the workshop: Understanding the Science of Climate Change, Vulnerability, Adaptation, and Mitigation. These issues are higher levels of aggregation of the environmental problems/issues and root causes that were identified at the earlier workshops and in the work of the consultants. Although they are directly about climate change, their constituents are the more detailed issues that can be seen to be contributing to the protection of biodiversity, and land degradation. Major environmental issues (coastal erosion, energy, wastes, sewerage, and biodiversity) as are identified in the State of the Environment Report for current years can also be included as issues under the 4 broad grouping of issues (Science of climate change, vulnerability, adaptation, and mitigation) in climate change.

The level of national capacity to address and elaborate further on the issues and root causes amounts to the level of Kiribati capacity to implement the UNFCCC. Gaps therefore in the national capacity will require that Kiribati capacity be enhanced in order to be able to implement the UNFCCC, and make its contribution to the protection of the global environment.

6. Gaps in National Capacity to address Climate Change

6.1 Understanding the Science of Climate Change.

Root causes of the issues that can be included under the above broad category are:

- Insufficient awareness and media programs on CC;
- Insufficient dissemination of CC information to the public;

- Non-inclusion in national curriculum;
- Technical problems at Met; and,
- Lack of meteorology information.
- Lack of skills to carry out V&A.
- Poor Performance or incompetence of staff.

It is misinformation of the science of climate change when it is advocated as being caused by ozone depletion. Yet many people in Kiribati believe that it is so. It is apprehensible if other equally credible sciences prevail in guiding policies on climate change. Yet some scientists think that because they have not discovered from their research in their field of science any indication of an impact of global warming, then there is no global warming, that is, climate change. Time is on their side so they believe, to encumber the science with politics and religions. This situation is undesirable and must be changed.

Kiribati government has now accepted climate change as a reality, and there is no risk that government may not be committed to address the effects and impacts of climate change. However, the pace of the evolving climate change and its impacts is something that is yet undeterminable and for this, keeping abreast of the science of climate change and monitoring the local situation is very important for decision makers and planners for climate change strategies.

As noted earlier the impacts are loss of biodiversity; loss of livelihood; coastal erosion; salt water intrusion; low ground water availability; coral bleaching; loss of production due to drought; increase costs of fossil fuel; oil supplies crises; loss of culture and identity, loss of land; destruction of infrastructure. A link of the first two of the root causes to the inability to address these effects or impacts is obvious.

If we were totally unaware of climate change, then our capacity to address the impacts or the environmental issues listed above will be restricted to addressing the non climatic change factors that contributed to the environmental issues. Replanting of plants, or stock enhancement for fisheries may just be considered as sufficient to address the loss of biodiversity caused by us alone.

The need for extra efforts at conservation and protection to counteract the effects of climate change may escape consideration for capacity building. Similar reasoning can be used to establish the links with loss of livelihood, coastal erosion etc. Climate change should therefore be taken into account, and the more accurately the science of climate change is understood, the more realistic the commitment is in proportion to the reality of the unfolding future.

Non-inclusion of topics on the science of climate change in school curriculum is relevant for capacity to be able to address the impacts of climate change also called here environmental issues. These impacts and climate change will continue into the foreseeable future, children now will soon be actors on the environment, and of its management, and in decision making process of the nation. They need to be better informed about, and deal with climate change at an early age.

Information provided from the Meteorological Service are relatively important in the understanding of thermodynamics in the atmosphere and Climate Change issues. However, technical problems at Kiribati Met such as the use of aged and inefficient type of instruments when there are more efficient modern instruments. The existing instruments on South Tarawa need replacements, more instruments are required for outer islands that are not equipped. In the meantime the situation of the meteorological equipments is such that the data coverage is not representative of the country, and contributes to the occasional instability of the operation. There are however plans through the MOP and KAP and NAPA project documents to address these capacity needs of the KMS.

Meteorological information, such as a 3 months rainfall prediction report known as the Kiribati Seasonal Climate Outlook (using SCOPIC) which is accessible now to Outer Islands will better serve the needs of these islands if they are willing to report daily/monthly rainfall data on voluntary basis.

The needs to strengthen the capacity of the KMS in the areas that are explained above should be among the top priorities for capacity building. This should improve **the** quality of data archive in the KMS. The data archive serves the national, regional, and international needs.

The last two root causes obviously contribute to the science of climate change, and for understanding the impacts. More understanding of climate change will improve understanding of the impacts, that is, the environmental issues.

Understanding of the science of climate change should be a capacity at individual, institutional, and systemic levels. In practice this is for the whole of government, the public and individuals. Policies and laws should not have effects that make Kiribati more vulnerable and less capable to adapt to climate change.

Government has acknowledged the authoritative scientific assessment of the Intergovernmental Panel on Climate Change. There is therefore a capacity need to glean relevant science from IPCC assessments, translate them into vernacular languages (English and Kiribati), convey information to government and to the general public. This is important when noting that the CCAS states that climate in the future is unknowable and therefore Kiribati needs to be prepared for it and to adapt accordingly.

To try to know what it is most likely going to be is to understand relevant information from IPCC regular assessment reports. But though that is the policy, the President and Churches have gone further than this, and expresses the real possibility that people in Kiribati may have to migrate to other welcoming countries, and for this training for skills in more developing and developed countries is important. This possibly suggests that government is exploring all avenues of adaptation for individuals and for the nation, and not giving up hope.

The SNC and KAP II do not include any efforts to study and communicate relevant information from IPCC Assessment Reports, and other Technical Reports. ECD will have a leading role in the tasks of understanding information from the IPCC and for

disseminating this to government and the public. Other divisions will have supporting roles, and the Meteorological Division will have key inputs into this. Local data need to be analyzed against some of the IPCC Assessments on global and regional situations. A mechanism and working methods to provide information from IPCC Assessments and reports need to be developed, agreed, and adopted.

6.2 Vulnerability to climate change

Root causes that can be placed under this broad category of issues are:

- 1 Insufficient funding.
- 2 Insufficient human resource.
- 3 Lack of legislation.
- 4 Uncontrolled beach mining.
- 5 Destruction of mangroves.
- 6 Negligence to replant Mangroves.
- 7 Illegal construction of poor design of seawalls and causeways
- 8 Lack of skills to carry out V&A.
- 9 Poor Performance or incompetence of staff.
- 10 Lack of understanding on designs/technologies
- 11 Limited vision to foresee climate change related impacts
- 12 Insufficient data

The root causes which relate to the quality and quantity of financial, human, and technological resources are also pertinent for the other category of issues. Vulnerability to climate change impacts is the very situation that Kiribati desires not to be in it, to avoid it. But it is the reality of its situation in this global climate change. Reduction of vulnerability is adaptation.

Climate change is the root cause of Kiribati vulnerability. The remedy to this root cause lies outside the powers of Kiribati alone. Yet the reality is that it is very vulnerable to the impacts.

In certain aspects and in few limited locations the nature of the vulnerability of Kiribati is better understood than in most other aspects and other locations. This is not assisted by the fact that in cases where the nature of vulnerability are better understood, inconsistent methodologies were used without uniform boundary conditions used in the vulnerability assessment. Misinformation about the science of climate change will generate big margin of error in any vulnerability assessment that use the misrepresented science.

There are sufficient number of I-Kiribati with science based training, and are employed in specialized ministries and technical divisions. A number are in the ECD. Many are members of the CCST. Whilst they have their own jobs for which their knowledge of the science is suited, they need to expand their scientific perspectives to incorporate those that relate to the science of climate change. Their field of work is vulnerable to climate change. Water for example, or fisheries, or coastal areas are vulnerable to climate change. I-Kiribati must understand how they are vulnerable to climate change.

The rest of the root causes clearly degrade the environment and therefore making it more vulnerable to the impacts of climate change. The degradation of the environment are

described in the range of environmental issues that have been noted, such as loss of biodiversity; loss of livelihood; coastal erosion; salt water intrusion; low ground water availability; coral bleaching; loss of production due to drought; increase costs of fossil fuel; oil supplies crises; loss of culture and identity, loss of land; destruction of infrastructure. Each of the root causes can be linked to any one of these environmental issues, also called here climate change impacts. The root causes also have an economic dimension.

These root causes are not within the competence of the whole of government alone to address. They entail national, regional, international cooperation. Internally they need the support and cooperation of the whole of Kiribati people. Uncontrolled beach mining, destruction of mangroves, and negligence to replant Mangroves require the support of the whole public, and the individuals.

Within the government system, allocation of responsibility for addressing the root causes will be guided by the presidential assignment of portfolios to different ministries. The MFED is responsible for “insufficient funds”, MELAD is responsible for lack of legislation, as an example. This is at systemic level and the responsible ministry in carrying out its responsibility needs to keep within and be bound by relevant current laws, policies, and normal practices of government such as collective responsibility, consultation with relevant ministries on issues of shared responsibilities.

Within the Ministries and their Divisions, areas of responsibilities, functions and roles are well established, down to the level of the individual officers. Usually the most senior officer of the Division is more informed of the overall government policies that may have implications for the Division’s functions and roles. But the rest of the staff of the Division are generally not informed. There is a need to strengthen and widen coverage in the flow of information. It is the differences in the levels of information held by individual participants at any consultations, such as for issues on vulnerabilities, that in the end determine the achievement of the purpose of the consultations. Indeed vulnerability to climate change affects all environmental, social, and economic areas of interests. It is an issue applicable as well to the loss of biodiversity, and land degradation.

6.3 Adaptation

Root causes that may be placed under this category are:

- 1 Insufficient data collection on vegetation
- 2 Insufficient data collection on land use and changes
- 3 Uncontrolled land use
- 4 Insufficient awareness and media programs on CC
- 5 Insufficient funding.
- 6 Insufficient human resource.
- 7 Lack of legislation
- 8 Uncontrolled beach mining.
- 9 Insufficient data

As noted above, Kiribati needs to be prepared for any sort of climate in the future. It

should in fact be prepared for the sorts of climate in the future as are deduced from IPCC Assessment Reports, recognizing that IPCC assessments are reliable on the global scale, less so if simply taken to apply in the local situation.

The reason why adaptation is necessary is because of Kiribati vulnerability to climate change impacts. These impacts which we call them also environmental issues are as identified by the NCSA workshops are again reiterated: loss of biodiversity; loss of livelihood; coastal erosion; salt water intrusion; low ground water availability; coral bleaching; loss of production due to drought; increase costs of fossil fuel; oil supplies crises; loss of culture and identity, loss of land; destruction of infrastructure.

Overlapping of the broad categories of environmental issues, that is an issue can be placed under one or more of the broad categories (science, vulnerability, adaptation, and mitigation) should be noted. This is because of the complexity of each of the issues such that there are facets of each issue that may require understanding of the issue relative to the science of climate change, other facets that strongly suggest “vulnerability implication” of the issue, and still other facets that require adaptation response to the issue. Other facets of the issue may place it under mitigation. The issue of loss of biodiversity can be considered as the science of climate change from the role of biodiversity in the cycle of carbon, an issue under vulnerability as when plants withered by droughts, an issue under adaptation as when considering protection and conservation areas, and an issue under mitigation when considering plants as sinks and storage of carbon.

Adaptation measures to address any of these environmental issues, that is impacts of climate change, are constrained by a number of those root causes. It is to be noted that any root cause may be of more than one or even of all the environmental issues. Inadequacy of financial resources is a constraint to plan and implement programmes to address coastal erosion, low ground water availability, destruction of infrastructure, etc. Insufficient data is a constraint to plan and implement adaptation programmes to address loss of biodiversity, coral bleaching, increase costs of fossil fuel, and loss of culture and identity, etc.

All past and current so called adaptation projects have not produced or created observable physical structures that can easily be recognized as a structural protection measure for the impact of climate change. NAPA produced a document, KAP I produced a KAP II. KAP II has various components that are on most of the issues but most are in the stage of vulnerabilities of Kiribati, that is, studies and planning. The SNC will produce a document. While expressing serious concerns about the vulnerability of Kiribati to climate change impacts, Kiribati has contended with the slow programmed and designed adaptation measures.

It is not that these projects do not address issues of climate change, and in particular adaptation. However, they have done so, under the precept of “no regret”. This is now outdated.

Physical structures are now required to protect public assets, community assets, and to meet the needs of communities for sufficient potable water.

Adaptation to climate change is an economic and environmental issue. It is also a social

issue. The KAP II is under the OB. Climate change is an issue of meteorological phenomenon, and of its infusion with the rest of the environment media. For the former it is the MCTTD that has responsibility, and for the latter it is the MELAD. The MISA has not been active in the area of climate change. A mechanism of bringing these bodies together for consultation and to provide joint oversight of adaptation projects exists. The mechanism now is in the form of the established committees: the CCST, ASC, and any working groups that may be established.

The committees need to be empowered and strengthened. There has been no effort to do this in the KAP II and the SNC. Special awareness raising programmes on the categories listed above, that is, science-vulnerability-adaptation-mitigation, need perhaps to be developed for members of the CCST, ASC, and other committees of the ECD.

6.4 Mitigation

Kiribati has no obligation to mitigate climate change. Although this is clearly explained in past workshops on climate change, there has been a clear intention of participants that Kiribati should have inputs into mitigation.

Root causes of any mitigation issues are:-

- Insufficient funding,
- Insufficient human resources,
- Insufficient legislation/regulations and policies,
- Insufficient data,

Environmental issues (impacts and effects of climate change) were identified from the perspective of the impacts of climate change. However, from implications of these issues on emissions of greenhouse gases, they can be considered as well as issues under the broad category of mitigation. The environmental issues can therefore be considered mitigation issues and their root causes are as listed above.

Mitigation issues are therefore loss of biodiversity; loss of livelihood; coastal erosion; salt water intrusion; low ground water availability; coral bleaching; loss of production due to drought; increase costs of fossil fuel; oil supplies crises; loss of culture and identity, loss of land; destruction of infrastructure.

As noted above, biodiversity in flora has a clear role in the carbon cycle, absorbs more than they release carbon, therefore a mitigation issue. This is not as clear for the fauna, but they could emit more carbon than they contribute to enhancement of sinks and storage. However, fauna and flora normally constitute distinct forms of life within ecosystems and these ecosystems have roles as sources and sinks of greenhouse gases, hence could also be an issue of mitigation.

The loss of livelihood implies more intensive harvesting of resources and this affects the biodiversity. Coastal erosion means loss of coastal vegetation. Salt water intrusion kills terrestrial vegetation. The low ground water availability adversely affects the flora. Coral bleaching remove some calcifying capacity of the marine area, and the associated algae in the polyps die too. The loss of production due to drought is loss of flora and more intensive and extensive exploitation of flora and resources. The increase in costs of fossil

fuel may reduce effective demands for fossil fuel thus reduce emissions from that source, but it may lead to exploiting more biomass for firewood. The balance is unknown but either way it affects the level of greenhouse gases emissions. The same line of reasoning will apply for fuel crises. The loss of culture and identity is the ultimate conclusion from failure of adaptation measures. It is also the ultimate conclusion from failure to limit and reduce greenhouse gases. The loss of land impoverishes subsistence livelihood, and lead to more exploitation of flora. The destruction of infrastructure impoverishes the economy and more people turn to subsistence livelihood. This impoverishes the latter and leads to more exploitation of flora.

No doubt there are other lines of reasoning that can justify the environmental issues to be both of adaptation and mitigation. Nonetheless, each issue can be assessed to be either much more of adaptation or of mitigation. The issues of increase costs of fossil fuel and oil supplies crises are much more of mitigation than the others.

KAP II has no components on mitigation. The SNC will support research into alternative forms of energy, and acquisition of information on appropriate technologies. PIGGAREP will however provide more assistance on the development and acquisition of renewable energy technologies including biofuels for electrification of outer islands, wind power feasibility study for Kiritimati, PV-grid pilot project at SEC headquarters, and technical and managerial trainings. PIGGAREP also provides for SEC managerial tools and equipment, but it draws attention to capacity need for record keeping and data management for all energy companies. This is an important gap not only for mitigation but as noted above for the science of climate change, vulnerability, and adaptation.

At the systemic level, review of existing laws and regulations is provided in the PIGGAREP and this capacity need is also recognized under the other broad categories of environment issues, that is “vulnerability” etc. A policy on mitigation of climate change, and energy policy are to be developed and this requires collaboration between the MPWU and MELAD. Awareness raising and consultations is likely to be a major activity for the development of such policies, but the PIGGAREP and the SNC do not provide adequate resources for this activity.

6.5 Capacity Building needs and prioritization.

In this subsection, we bring together in summary what seems to have been the scope of capacity needs as are identified in the NCSA process. Environmental issues (climate change impacts and effects) are identified by the workshops and by the consultant who first undertook this consultancy. These issues are aggregated under the more used frameworks for understanding climate change. These are the science of climate change, vulnerability, adaptation, and mitigation. In analyzing this higher level classification, it is noted they are not clearly distinct. We show that any one of the environment issue can fit into more than one of these higher level classifications. Similarly the identified root causes can fit into more than one of the environmental issues.

The above observation is not unexpected, for they demonstrate the interconnectedness of the components and small parts of the environment. This feature may justify selection of priority environmental issues and priority root causes for they will have remedial effects

on other less priority issues and causes.

Within the climate change, the priority environmental issues should be those that contribute to all the broad categories of “understanding the science of climate change”, “vulnerability”, “adaptation”, and “mitigation”. They should be prioritized on the basis of how far they contribute to capacity building needs of implementing the other two conventions – UNCBD, and UNCCD. Root causes were shown to apply to more than one environmental issues. They will be prioritized on the basis of their relevance to each of the environmental issues. A final prioritization is the prioritization root causes-environmental issues.

6.5.1 Prioritization of environmental issues and their climate change categories

We use a score of 0,1,2,3 for very weak, weak, strong, and very strong relevance of the issues and the conventions.

Table 6.1 Environmental issues prioritized on the basis of relevance to the conventions

	UNFCCC					UNCBD	UNCCD	All Total Score
	<i>Science</i>	<i>Vulnerability</i>	<i>Adaptation</i>	<i>Mitigation</i>	<i>Total</i>			
Loss of biodiversity	3	3	3	2	11	3	2	16
loss of livelihood	1	3	3	1	8	2	2	12
coastal erosion	3	3	3	2	11	1	1	13
salt water intrusion	2	2	3	0	7	2	3	12
low ground water availability	3	3	3	1	10	1	3	14
coral bleaching	2	3	2	1	8	3	2	13

loss of production due to drought	2	3	3	0	8	2	3	13
increase costs of fossil fuel	0	1	0	2	3	2	2	7
oil supplies crises	0	1	1	2	4	2	2	8
loss of culture and identity	3	1	1	0	5	1	2	8
loss of land	2	2	3	2	9	2	3	14
destruction of infrastructure	2	3	3	0	8	0	1	9
	23	28	28	13				

On the basis of the above, climate change groupings of “vulnerability” and “adaptation” are top priorities, followed by “understanding of the science”, then “mitigation”. For environmental issues the loss of biodiversity is top priority followed by two equals- low ground water and loss of land, then by three equals – coastal erosion, coral bleaching, loss of production due to drought. The next two equals are loss of livelihood and salt water intrusion.

6.5.2 Prioritizing Root Causes

We then prioritize the root causes of environmental issues that are explained above. After removing repetitions, there are only 8 causes identified. We use the same values of degrees of relevance and scale numbers as above.

Table 6.2 Environmental issues by Root Causes and Rankings

	ROOT CAUSES						
	Insufficient awareness and media progs on CC	Non-inclusion in national curriculum	Technical problems at Met	Insufficient funding.	Insufficient human resource.	Lack of legislation	Uncontrol beach mining.
Loss of biodiversity	3	3	0	3	3	2	1
loss of livelihood	2	0	0	1	3	3	1
coastal erosion	3	2	3	3	3	3	3
salt water intrusion	0	0	2	3	1	2	2
low ground water availability	3	3	3	3	3	3	0
coral bleaching	1	1	2	3	3	2	3
loss of	0	0	3	1	1	1	1

production due to drought							
increase costs of fossil fuel	0	0	0	2	0	0	0
oil supplies crises	0	0	0	2	0	2	0
loss of culture and identity	0	3	0	3	3	0	0
loss of land	3	0	3	3	0	2	3
destruction of infrastructure	2	0	1	3	3	2	3
Total	17	12	17	30	23	22	17

On basis of the above, the top priority root causes is lack of data, followed by insufficient funding, then insufficient human resources and lack of legislation. Next priority root causes are lack of awareness raising, meteorological technical problems, and uncontrolled beach mining.

6.5.3 Combined prioritization of root causes and environmental issues

The environmental issues, in a decreasing order of the degree of their relevance to all root causes, are:- coastal erosion, low ground water availability, coral bleaching, loss of biodiversity together with loss of land, loss of livelihood with salt water intrusion, loss of culture and identity, loss of production due to drought, oil supplies crises, and finally increase in price of oil.

We appear now to have used two sets of criteria to assess the priority of environmental issues: criteria of relevance to climate change and other conventions, and criteria of relevance to root causes. These are shown in the table below:

Table 6.3 Comparative priorities of environmental issues

Order of priority according to relevance to the Conventions	Order of priority according to identified root causes.
Loss of biodiversity	coastal erosion
low ground water availability	low ground water availability
loss of land	coral bleaching
Coastal erosion	Loss of biodiversity
coral bleaching	loss of land
loss of production due to drought	destruction of infrastructure
loss of livelihood	salt water intrusion
salt water intrusion	loss of livelihood
destruction of infrastructure	loss of culture and identity
oil supplies crises	loss of production due to drought
loss of culture and identity	oil supplies crises
increase costs of fossil fuel	increase costs of fossil fuel

If we combine the priorities of each of the environmental issues above, we get a table shown below.

Table 6.4 Combined priorities of environmental issues

Environmental issues	Order of priority according to relevance to the Conventions	Order of priority according to identified root causes.	Overall priority scores	Priority ranking
Loss of biodiversity	1	4	5	2nd
low ground water availability	2	2	4	1st
loss of land	3	5	8	3rd
Coastal erosion	4	1	5	2nd
coral bleaching	5	3	8	3rd
loss of production due to drought	6	10	16	5th
loss of livelihood	7	8	15	4th
salt water intrusion	8	7	15	4th
destruction of infrastructure	9	6	15	4th
oil supplies crises	10	11	21	7th
loss of culture and identity	11	9	20	6th
increase costs of fossil fuel	12	12	24	8th

If another person is to do the same exercise, there may be differences. It is however believed that the differences will be very slight.

Capacity building needs will relate to the root causes. The root causes relate to any of the above environmental issues. Their priorities will then follow the priorities of the environmental issues.

7. Identified National Capacity Needs to implement the UNFCCC

This section brings all the root causes, environmental issues, and climate change groupings together in the table below.

Table 7.1 Climate Change Groupings containing Environmental Issues and Root Causes

Climate Change Groupings	Environmental Issues	Root Causes	Comments
	Loss of biodiversity	<ul style="list-style-type: none"> •1 Insufficient awareness and media progs on CC •2 Insufficient funding. •3 Insufficient human resource. •4 Non-inclusion in national curriculum •5 Lack of legislation •6 Insufficient data 	<p>Attitude and behaviour to biodiversity usually encourage destruction of wildlife. Awareness program hopes to change that.</p> <p>Protection of biodiversity such as by establishing CAs on each island requires funds.</p> <p>Understanding biodiversity, establishing and monitoring CAs and MPAs require trained personnel.</p> <p>Early influence of attitudes is favourable to protection of biodiversity.</p> <p>Elements of biodiversity exist in certain laws; they need harmonized and gaps addressed.</p> <p>Inventories of varieties of life forms, marine and terrestrial, are still incomplete. Available data dispersed among Ministries. No system to bring info together, etc.</p>

	<p>Loss of livelihood</p>	<ul style="list-style-type: none"> •1 Insufficient human resource. •2 Lack of legislation •3 Insufficient data •4 Insufficient awareness and media programmes on CC. •5 Insufficient funding •6 Uncontrolled beach mining. 	<p>Trained and skilled human resource more likely to have wider options for livelihood. People considered as producers.</p> <p>Exploitation of resources without consideration of sustainable rates.</p> <p>Baseline data on activities, environmental resources in use, and skills is understanding livelihood. Data is lacking.</p> <p>Awareness leads to consciousness about the need not to be wasteful on resources, or destroy the environment without any care.</p> <p>Funds will enable collection of data and understanding livelihood, and exploring alternatives.</p> <p>No alternatives of livelihood perpetuate uncontrolled beach mining. Beach is habitat for many life forms that are in the lowest rung of the food chain.</p>
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	<p>Coastal erosion</p>	<ul style="list-style-type: none"> •1 Technical problems in the Met. •2 Insufficient funding. •3 Insufficient human resources. •4 Insufficient data •1 Uncontrolled beach mining •1 Insufficient awareness and media progms on CC. •2 Lack of legislation 	<p>Coastal structures affect the dynamics of the natural processes of the coast. Met data helps to understand the processes and to design structures with least adverse impacts on the coast.</p> <p>Some areas need protection, establishing guidelines on good practices for coastal protection.</p> <p>Technical work for designing coastal structures, guidelines on good practices, and for data and mapping.</p> <p>Data on vulnerable areas including hazardous zones. Without these we cannot protect them, leading to further erosion.</p> <p>Leads to coastal erosion; need to address this.</p> <p>Awareness leads to a consciousness of the need not to do acts that enhances coastal erosion.</p> <p>Laws that touch on coastal erosion need reviewing, harmonizing, and gaps addressed. Enforcement is also difficult.</p>
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	Salt water intrusion	<ul style="list-style-type: none"> •1 Insufficient funding •2 Insufficient data •3 Uncontrolled beach mining •4 Lack of legislation •5 Technical problem at the Met. •6 Insufficient human resource 	<p>Wells need better construction and protection.</p> <p>Vulnerable sites need mapping, alternative sources of water identified and protected.</p> <p>Buffer zone between the sea and wells or agricultural soil weakened.</p> <p>Buildings and residential sites may well be at most vulnerable areas.</p> <p>Salt water intrusion is associated with sea level and storm surges. Early warning requires good coverage of met data.</p> <p>Undertaking of above requires personnel.</p>
	Low ground water availability	<ul style="list-style-type: none"> •1 Insufficient awareness and media progms on CC. •2 Non inclusion in national curriculum. •3 Technical problem at the Met. •4 Insufficient funding. •5 Insufficient human resource. •6 Lack of legislation •7 Insufficient data. 	<p>Awareness leads to a conscious need not to be wasteful on resources, or destroy the environment without any care.</p> <p>Early influence of attitudes by science is favourable to protection of resources.</p> <p>Climate prediction requires data coverage; climate prediction is useful for anticipating the ground water availability.</p> <p>Rainwater tanks, and iron roofings require funds.</p> <p>Quantity and quality of ground water lens to provide for the villages need to be known.</p> <p>Known groundwater lens should be protected by legislation.</p> <p>Data about location, quantity and quality of water lenses, and villages who or may tap the lenses.</p>

	<p>Coral bleaching</p>	<ul style="list-style-type: none"> •1 Insufficient funding •2 Insufficient human resources •3 Uncontrolled beach mining •4 Insufficient data. •5 Technical prob at the Met •6 Lack of legislation. •7 Insufficient awareness raising •8 Non inclusion in national curriculum. 	<p>The extent of coral bleaching not fully known and monitoring not systematic.</p> <p>Coral bleaching and identification of types, and coverage need to be known.</p> <p>Destruction of live corals.</p> <p>Data is needed to make informed plans that strengthen the health of corals.</p> <p>Met data are important for monitoring, and to understand coral thresholds.</p> <p>To control destructive beach mining, etc.</p> <p>Awareness leads to a consciousness of the need not to do acts that enhances coral bleaching.</p> <p>Early influence of attitudes by reliable science is favourable to protection of resources.</p>
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	<p>Loss of production due to drought</p>	<ul style="list-style-type: none"> •1 Technical prob at the Met. •2 Insufficient data. •3 Insufficient funds •4 Insufficient human resources. •5 Lack of legislations •6 Uncontrolled beach mining. 	<p>Early warning system so as impact minimized.</p> <p>Data on drought impacts, how people cope for water and loss of agric production.</p> <p>To implement agric program that may increase production of trees.</p> <p>Thresholds of environmental requirements for crop production could assist in determination of drought conditions.</p> <p>Ways to control destructive agricultural practices, and risks from pests may need legislating.</p> <p>Beach mining may lead to erosion, therefore risks to ground water lens.</p>
	<p>Loss of culture and identity</p>	<ul style="list-style-type: none"> •7 Non inclusion in national curriculum. •8 Insufficient funds. •9 Insufficient human resources. •10Lack of data. 	<p>Culture and identity may be strengthened through curriculum; at the same time, recognizing what may threaten these.</p> <p>Adaptation, and protection of cultural materials.</p> <p>For adaptation, and lobbying for mitigation failing which loss of culture and identity is inevitable.</p> <p>Material culture, abstract elements of culture and identity etc are not compiled.</p>

	<p>Loss of land</p>	<ul style="list-style-type: none"> •11 Insufficient funds. •12 Uncontrolled beach mining. •13 Insufficient data. •14 Technical problem at the Met. •15 Non inclusion in national curriculum. •16 Lack of legislation. 	<p>Adaptation and protection of the land require funds which being insufficient leads to further loss of land.</p> <p>Exposes the land to more erosion.</p> <p>Loss of land can be better checked in programs that are based on realistic data on natural forces, human activities, and their impacts.</p> <p>Meteorological data are among the data on natural forces that are required for designing program to check the loss of land. The earlier in their lives the stakeholders become aware of the problem of loss of land, the more natural for them not to do acts that exacerbate the problem.</p> <p>Certain acts make the land more prone to erosion. For these legal proscription is desired.</p>
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	<p>Destruction of infrastructure</p>	<ul style="list-style-type: none"> •1 Insufficient funding. •2 Insufficient human resource. •3 Uncontrolled beach mining. •4 Insufficient data. •5 Lack of legislation. •6 Insufficient awareness raising. •7 Technical prob at the Met. 	<p>Protection of infrastructure or relocating them require funds, which insufficiency will expose the infrastructure to continuing damage.</p> <p>Structural protection of infrastructure, or climate proofing infrastructure requires suitable designs. The designs need human resources which insufficiency will allow the infrastructure to easily succumb to destructive forces of climate change.</p> <p>This undermines infrastructure.</p> <p>The extent of damage to infrastructure is not known. This fact does not give timely warning when action should be taken for different types of infrastructure and locations.</p> <p>Both the design and location of the infrastructure determine its exposure to damage from climate change. These may require their being regulated.</p> <p>Awareness about climate change may influence individuals to avoid designs and locations that are risky with respect to climate change impacts.</p> <p>Any design or selection of location for infrastructure will need climate data.</p>
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	Loss of biodiversity	Root causes of biodiversity implies the need to increase scientific information, including on climate change and impacts on biodiversity.	As the comments above relate to the need for scientific information. Implicit also is the need to get reliable information of the state of knowledge on the science of climate change
	Coastal erosion	As above	As above
	Low ground water availability.	As above	As above
	Loss of culture and identity.	As above	As above
	Salt water intrusion	As above	As above
	Coral bleaching	As above	As above
	Loss of production due to drought	As above	As above
	Loss of land	As above	As above
	Destruction of infrastructure	As above	As above
	Loss of livelihood	As above	As above
	Increase costs of fossil fuel	<ul style="list-style-type: none"> •5 Technical problems in the Met. •6 Insufficient funding. •7 Insufficient human resources. •8 Insufficient data 	<p>Data required for renewable energy technologies, thus reducing dependency on fossil fuel.</p> <p>Acquisition of technologies require funds.</p> <p>Training of technical personnel in new technologies, and for undertaking research.</p> <p>Other data than met data are also required in any development of renewable energy including fuel wood.</p>
	Oil supplies crises	As in the immediate cell above.	As above

	Loss of land	As above against the same issue. Root causes contribute to loss of land.	Loss of land means deforestation.
	Loss of biodiversity	As above against the same issue.	Loss of biodiversity means deforestation.
	Coastal erosion	As above against the same issue	Coastal erosion means deforestation.
	Loss of livelihood	As above against the same issue.	There is tendency to overexploit the resources, therefore deforestation.
	Low ground water availability	As above against the same issue.	This can amount to hence reduction in vegetation cover.
	Coral bleaching	As above against the same issue.	Coral as sinks of carbon.

If we were to prioritize on the basis of section 6 above, then “Low ground water availability” is the first priority of the environmental issues. And as shown in the table above it covers the three climate change groupings of the environmental issues. It covers most of the root causes, all except “uncontrolled beach mining”. That assessment on the “uncontrolled beach mining” as not affecting “low ground water availability” is however incorrect because beach mining leads to coastal erosion, hence land width decreases and this has been shown in models to affect the groundwater lens (Alam et al. 1997).

If we wish to prioritize the root causes, then from table 6.2 above, we will have “insufficient data”, then “insufficient funds”, and the third is “insufficient human resources” for the overall ranking of causes across all environmental issues. But confining to the particular environmental issue (low ground water availability), then most of the root causes have the same priorities, except the “uncontrolled beach mining”.

We hope we have demonstrated the use of the tables above.

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