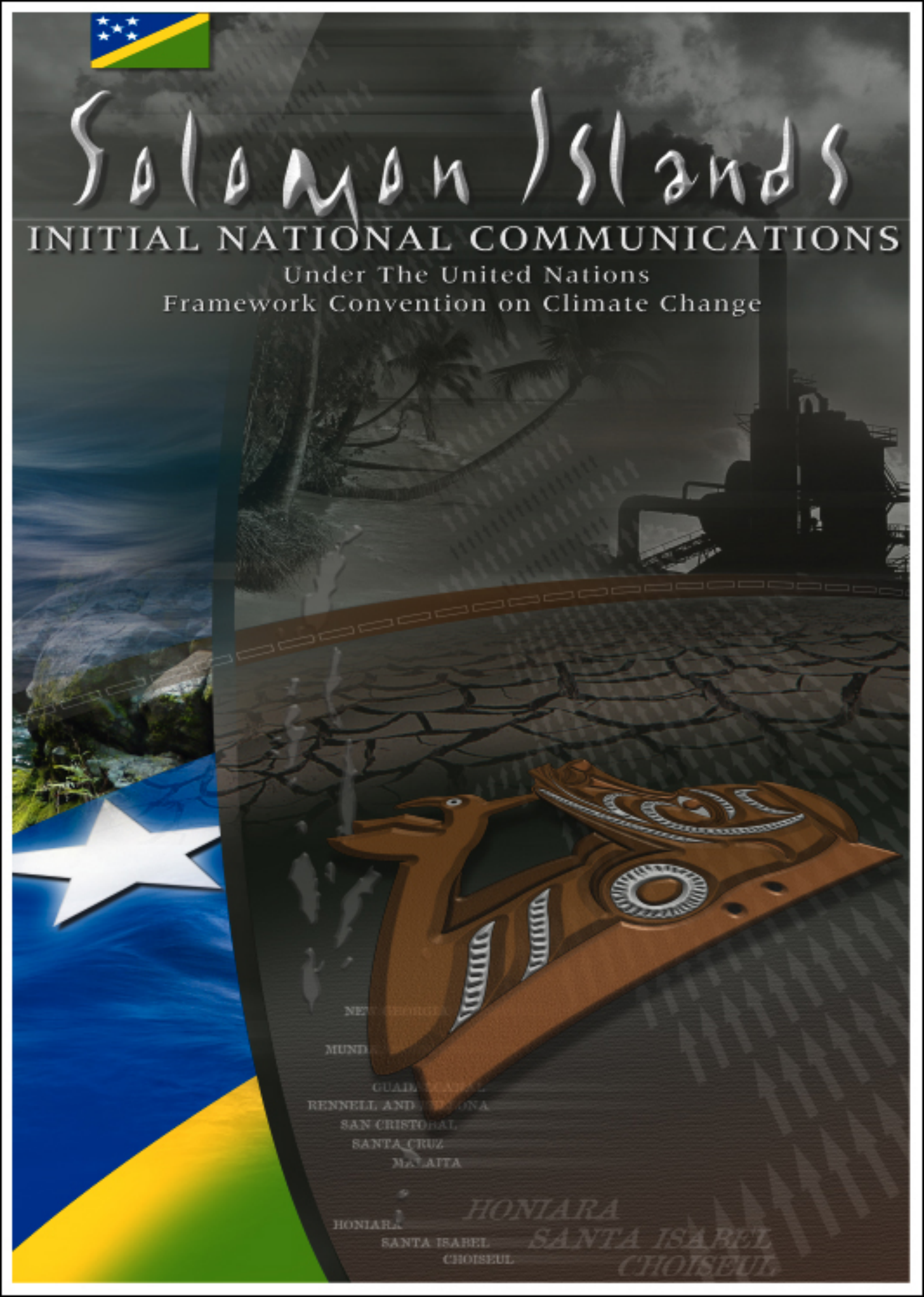
Solomon Islands
INITIAL NATIONAL COMMUNICATIONS
Under The United Nations
Framework Convention on Climate Change
RENNELL AND
SAN CRISTOBAL
SANTA CRUZ
HONIARA
SANTA ISABEL
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Finally, a word of thanks and gratitude to all stakeholders for availing information and data used in this document, and the production of this document.

FOREWORD

Under Articles 4 and 12 of the United Nations Framework Convention on Climate Change (UNFCCC) all parties to the Convention are obliged to prepare and submit national communications to the UNFCCC Secretariat. The government and people of the Solomon Islands are pleased to be able to submit this initial National Communication of the commitments undertaken to address the cause and effects of Climate Change.

As a small-island developing nation, the Solomon Islands are extremely vulnerable to the impacts of climate change. The protection of the people and their property is the most important role of any national government, and the potential threat posed by climate change and accelerated sea-level rise to those living in small island states is well documented. Being a global issue it is also well known that only concerted international effort will reduce the threat posed by climate change. For this reason the government of the Solomon Islands considers the UNFCCC to be a particularly important international agreement.

This document contains an overview of the environmental, social, geographical and economic circumstances of the Solomon Islands; presents a comprehensive national greenhouse gas inventory; addresses the issues of mitigation and vulnerability; and adaptation; and concludes with a summary of public awareness, education and capacity building within the people of the Solomon Islands. It is an important reference for all those who are charged with the responsibility of addressing the climate change issue. It is the earnest hope of all Solomon Islanders that the information in this document, together with that in similar documents produced by all Parties to the UNFCCC, will provide the basis for a secure and prosperous future for all.

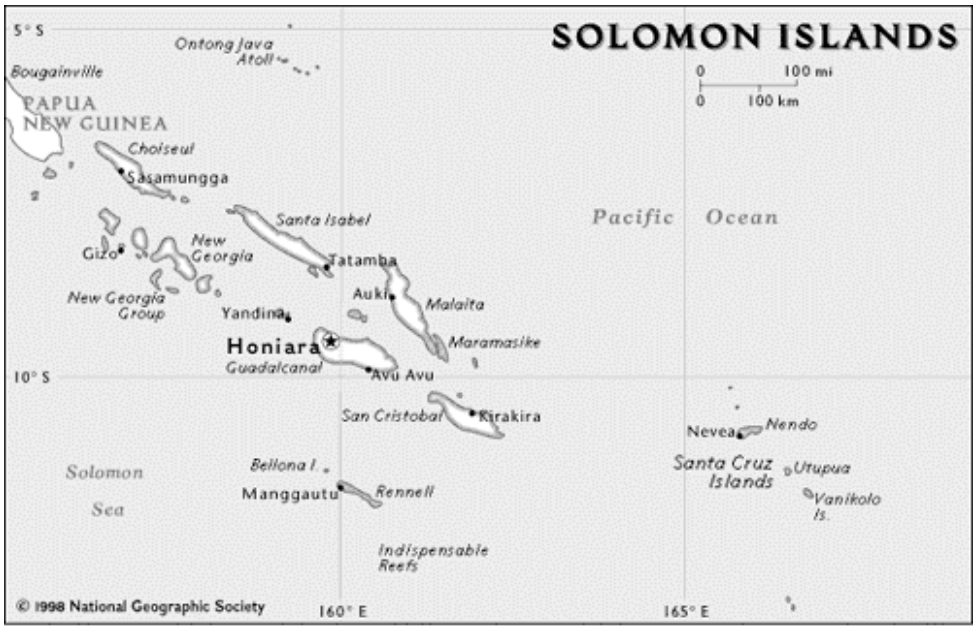
Finally, I would like to dedicate this document in memory of the former Director of Meteorology and National Coordinator of the Pacific Islands Climate Change Assistance Programme (PICCAP) in Solomon Islands, the late Mike Ariki whose efforts and hard work has resulted in the production of this document.

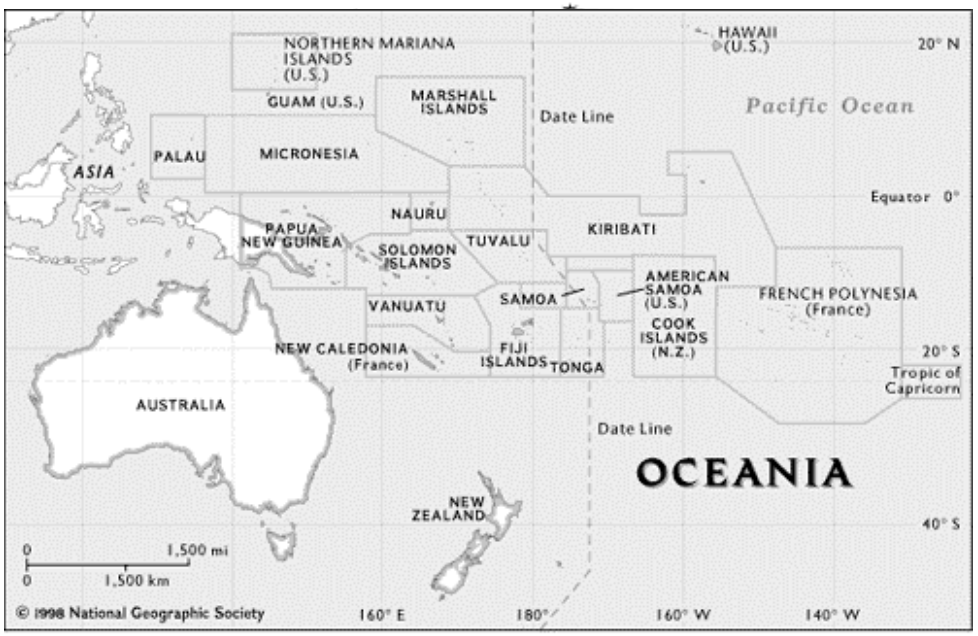
Honorable Johnson Koli (MP)
Minister
Ministry of Culture, Tourism and Aviation

ACRONYMS AND ABBREVIATIONS

BMRC	Bureau of Meteorology Research Centre (Australia)
CBSI	Central Bank of Solomon Islands
CDC	Commonwealth Development Company
CDM	Clean Development Mechanism (Kyoto Protocol Article 12)
CEM	Commodities Export and Marketing Authority
COP	Conference of the Parties
CSIRO	Commonwealth Scientific and Industrial Research Organisation, GCM
ECHAM	European Community, Hamburg
EEZ	Exclusive Economic Zone
ENSO	El Nino Southern Oscillation
EU	European Union
GCM	General Circulation Model
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse Gas
ICLARM	International Centre for Living Aquatic Resource Management
ICZM	Integrated Coastal Zone Management
IGCI	International Global Change Institute, The University of Waikato, New Zealand
IPCC	Intergovernmental Panel on Climate Change
IS92	Set of IPCC Scenarios. Six projected scenarios are available (IS92a, IS92b, IS92c, IS92d, IS92e, and IS92f)
MOU	Memorandum of Understanding
MTDS	Medium Term Development Strategies (Solomon Is. Government)
NFD	National Fisheries Development
PICCAP	Pacific Islands Climate Change Assistance Programme
RIPEL	Russell Islands Plantation Estates Limited
SIAC	Solomon Islands Alliance for Change Government
SIEA	Solomon Islands Electricity Authority
SIPL	Solomon Islands Plantations Limited
SIW	Solomon Islands Water Authority
SOI	Southern Oscillation Index
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change

Map of Solomon Islands and Location





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EXECUTIVE SUMMARY

Introduction

The Solomon Islands initial National Communication is part of first steps taken by Solomon Islands toward fulfilling its commitments to positively address the causes and effects of Climate Change. This first edition reinforces the importance of public awareness on the implications of climate change and capacity building in the process of drawing-up appropriate responsive policies and action plans at the national level. Data on which this document is based are the first of its kind to be collected in Solomon Islands. Thus, this particular edition is critical as it contains information that subsequent Communications will use for benchmarking. It presents initial assessments on resources that the country would need in order to put to place effective responsive actions.

National Circumstances

Solomon Islands is made up of a land mass of 28,336 square kilometres, was inhabited by a population of about 400,000 people in 1996, with an annual growth rate of 3.5%. It is a tropical country located in the South Pacific with considerable fishery, forest, mineral and water resources. There is relatively abundant and fertile agricultural land.

The forestry sector has until 1997 accounted for about 45-55% of foreign exchange and 20-30% of government revenue. The annual rate of extraction is 750,000 cubic meters which is three times the sustainable extraction level. Presently, the government policy is aimed at restoring the logging rate to sustainable levels. The agricultural sector exports are primarily palm oil, palm kernels, copra, coconut and cocoa. There is substantial fish resource in the country's EEZ and the biologically sustainable annual catch level (120,000 tons) has never been attained. Fisheries and agriculture are key contributors to GDP, but subsistence agriculture is the dominant economic activity. The average annual rainfall is within the range of 3000 to 5000mm allowing abundant water supply in the country. The successful establishment of the Gold Ridge gold mining venture has revived interest in mineral exploration.

Convention Analysis

The implementation of the UNFCCC and the Kyoto Protocol offers the opportunities for developing countries, including Solomon Islands, to take action in combating climate change and its adverse effects, and towards attaining sustainable development. Solomon Islands has identified the major constraints in implementing the convention to be a lack of financial resources; lack of expertise and trained local manpower; lack of technology and know-how; and a lack of relevant data and information. The convention provisions on financial resources and technology transfer are therefore critical for the participation of Solomon Islands in the implementation of the convention and the protocol.

National Greenhouse Gas Inventory

Solomon Islands greenhouse gas inventory has reported emissions of carbon dioxide (CO2) from the energy sector. Lack of information and data is the main reason for not reporting greenhouse gas emissions from other sectors (Land Use Change and Forestry; Industries, Manufacturers and Construction; Agriculture; and Waste Management) and the level of emissions of other greenhouse gases (methane, nitrous oxide). The greenhouse gas inventory follows the Revised IPCC Guidelines for national greenhouse gas inventories. The IPCC default values for emission factors were also used in the inventory.

The top down approach was used in this inventory. However, estimation was also used in employing the bottom up approach to estimate emission distribution among consumers and users of energy from the different sectors. The Solomon Islands 1994 National Greenhouse Gas Inventory, undertaken in 1999, presents a more detailed inventory of greenhouse gas emissions from the energy sector.

It is believed that carbon dioxide is the most important greenhouse gas in Solomon Islands which is emitted primarily from the burning of fossil fuel in the energy sector. Energy generation is fossil fuel based.

In 1994 the total emission of carbon dioxide using the top down approach for the energy sector alone is 322.60 Gg CO2. This equates to 0.84 tons per capita of emissions. The table below summarizes the results for carbon dioxide emissions from the different fossil fuels used in the energy sector.

Summary of CO_2 Emission from Fossil Fuel in Top Down Approach

Fuel Type	Total Fuel Imported (kilotons)	Apparent Consumption (kilotons)	Apparent Consumption Terajoules (TJ)	Actual CO_2 Emissions (Gg CO_2)	Percentage (%)
Gasoline	16.25	16.25	728	49.95	15.48
Jet Kerosene	4.8	3.3	147.15	10.42	3.23
Other Kerosene	3.62	3.62	162.00	11.53	3.57
Diesel oil	76	76	3293.08	241.47	74.86
Lubricants	2.2	2.2	88.42	6.45	2.00
LPG Gas	0.94	0.94	44.47	2.78	0.86
Total CO_2 Emissions from Top Down Approach (Gg CO_2)				**322.60**	**100.00**

Vulnerability and Adaptation Assessment

This chapter provides a concise statement of the current limited understanding of the vulnerability of Solomon Islands to climate and sea-level change. Solomon Islands should put in place suitable adaptation plans, policies and measures. These are of value as Solomon Islands is already vulnerable to extreme climatic events such as flooding associated with heavy rainfall and tropical cyclones and droughts associated with the El Nino phenomenon. These events have increased in frequency, intensity and duration, and may be exacerbated in the future by climate and sea-level change. At this stage it is difficult to quantify the vulnerability of Solomon Islands as a whole. However, given the complexity and diversity of Solomon Islands it is evident that there will be vulnerable islands, vulnerable areas on islands, vulnerable ecosystems, and vulnerable people. Responding to these vulnerabilities through effective adaptation measures and strategies needs to be a vital component of the sustainable environmental, social, and economic development of Solomon Islands.

The key findings from this assessment are:

- Scenarios of climate change suggest an increase of the surface air temperature in Solomon Islands and this is supported by Solomon Islands own historical data. However, present scenarios for rainfall suggest little change in annual means.

- With only one tide gauge for the country, there is presently limited information on local sea-level changes in Solomon Islands. The present state of knowledge of possible sea level change is limited to scenarios of global average sea-level change.

- Increasing population and development activities has led to pressure on land resources. This has caused environmental and social problems such as land conflicts. These rapid changes have led to an increase in demand for health services, water supplies and other resources. Environmental, economic and social changes will continue and unless there is proper management this will lead to an increase in the vulnerability of Solomon Islands to climate and sea-level change.

- Subsistence and commercial agriculture are strongly influenced by extreme climatic conditions such as droughts, flooding and cyclones. Future climate change and increases in frequency or intensity of these extreme events could lead to production losses both in the subsistence and commercial sectors.

- Coastal environments and systems are at risk from sea level rise and warmer sea temperatures. Areas most vulnerable to flooding and inundation as a result of sea level rise, with the combined effects of seasonal storms, high tides and storm surges associated with tropical cyclones, are the populated coastal lowlands and low-lying islands and atolls. Coastal erosion is already evident in many parts of the country. Additionally, coral bleaching has occurred during El Nino events.

- Human health will be affected by climate change and extreme events. Increased frequency of cyclones and flooding will have an impact on public health including loss of life, injury and outbreaks of cholera and other diarrhoeal diseases. Malaria may increase in the future and spread to the mountain areas of the major islands. Higher temperatures may also favour increased incidence of the more dangerous falciparum malaria in mountain areas.

- Groundwater resources of the lowlands of high islands and atolls may be affected by flooding and inundation from sea level rise. Water catchments of smaller, low-lying islands will be at high risk from any changes in frequency of extreme events. Likewise, any increases in frequency and intensity of extreme events will affect the quantity and quality of water throughout Solomon Islands.

- The 1997/98 the El Nino event reduced tuna catches in Solomon Islands, possibly due to changes in oceanic temperatures and circulation. Increased frequency and intensity of El Nino events may result in further reductions of tuna catches and any future changes in sea surface temperatures may diminish Solomon Islands' tuna stocks.

- A number of adaptation measures and strategies have been identified which could be implemented, but at present not enough is known about effects. It is not known how effective the different adaptations might be, and there are presently major constraints to implementation.

Mitigation

It is assumed that the major greenhouse gas emitted in the Solomon Islands is carbon dioxide, primarily from the energy sector. Even though the government does not have a policy on climate change, there are certain government development policies and strategies, particularly in the energy and forestry sector that are of relevance to climate change mitigation. Therefore, options for climate change mitigation are focused on the utilization of renewable energy (hydro and solar) energy efficiency and conservation technologies as per government approved policies and strategies.

Public Awareness, Education, Training and Capacity Building

Awareness campaigns are on going. However, in order for public participation, certain public awareness and education programmes are suggested. There is a critical need for training of experts to undertake research and country studies on the various aspects of climate change in Solomon Islands. These include capacity building in the implementation of the Convention and institutional strengthening. Priority needs for training and capacity building are identified in this chapter.

Climate Change Project Concepts

Some project concepts as identified from the various chapters of the document and project profiles are presented. However, cost estimates were not given due to lack of information and technology requirements. The focus was on mitigation (new and renewable energy systems) and enabling activities. The profiles focused on mitigation in the energy sector, in accordance with government development plans and strategies.

National Communication

This section of the document describes the steps undertaken to develop this document and identify the constraints and needs. The major constraints were identified to be lack of data and information, expertise and skills and the dedicated expertise to carry out the various tasks involved. Funding for the preparation of this Initial National Communication was provided under the Convention's enabling activities through PICCAP.

TABLE OF CONTENTS

1 NATIONAL CIRCUMSTANCES

Table of National Circumstances	
Criteria:	**1994**
Population	383657 (*estimate*)[1]
Relevant Areas (square kilometres)	Land: 28,370 EEZ: 1.34 million
GDP (1994 US$)	$313 million *Source: Central Bank of Solomon Islands*
GDP per capita (1994 US$)	$815 *Source: Central Bank of Solomon Islands*
Estimated Share of the Informal Sector in the Economy in GDP (percentage)	17.4 *Source: Central Bank of Solomon Islands*
Share of Industry in GDP (percentage)	5.9 *Source: Central Bank of Solomon Islands*
Share of Services in GDP (percentage)	23.5 *Source: Central Bank of Solomon Islands*
Share of Agriculture in GDP (percentage)	15.8 *Source: Central Bank of Solomon Islands*
Land area used for Agricultural Purposes (sq km)	2001 *(19,760 ha)*
Urban Population as Percent of Total Population	15 *Source: Statistic Division, MOF, Solomon Islands*
Livestock Population (disaggregate as appropriate)	Pigs: 20000 *estimated* Cattle: 2000 *estimated* Poultry: 15000 *estimated*
Forest area (square km, define as appropriate)	Forests: 24200 Climax Shrub Formations: 800 Grass Savannas: 200 Healthlands (fern communities): 50 Crops and Bush Fallow: 2500-3000 *Source: Leary. T (1993) SI State of the Environment Report*
Population in Absolute Poverty	Not appropriate in Solomon Islands
Life Expectancy at Birth (men/women years)	Men: 60 Women: 61 *Source: UNDP Human Development Report (1993)*
Literacy Rate	62 % (adult literacy) *Source: UNDP Human Development Report (1993)*

[1] *Source: Secretariat of Pacific Community website http://www.spc.org.nc*

1.1 Land Issues

Solomon Islands is made up of hundreds of coral atolls and small volcanic islands congregated to form an archipelago of islets stretching some 1,600 kilometers from Papua New Guinea to the north of Vanuatu in the east. These islands share a total landmass of 28,336 square kilometers, making Solomon Islands second largest in the Southern Pacific Islands region. As an island zone, a large number of smaller islands in the country are low lying and exposed with largely non-useable lands and poor coral soils that support minimal economic activities. Thus it is inevitable that livelihood in a large number of these islands are reliant on the sea.

Source: http:/www.commerce.gov.sb

Land in Solomon Islands is predominantly owned by tribes and generally recognised to be restrictive in the rights accruable to individuals. Traditionally, land is arguably the greatest source of wealth in Solomon Islands and as most rural islanders remain subsistence oriented, land is one of the major keys to creation and distribution of wealth. The increasing importance of land use for cash economic developments has only reinforced the traditional position of land. On the other hand however, this has led, in many instances, to distortions in land ownership and significant deviations from the concept of group-ownership. Consequently, while there appear to be conformity in the manner in which land is distributed amongst island groupings, deliberate evasions of how lands are disposed of and redistributed amongst members of land owning units have imposed complex systems of ownership. These events have complicated the issue of land acquisition.

The government is undertaking major restructuring in lands that will see rearrangements in land ownership and land use while maintaining the traditional principles of land ownership. This will also look into how the Department of Lands is to administer lands effectively in the most transparent manner as required under Land Legislation passed recently by Parliament. As part of this restructuring, the government is pursuing a policy that will lead to the return of all alienated lands to landowners. It is presumed that a clearer demarcation of land ownership as a result of the proposed

arrangements will encourage land owning units to fully participate in the development of their land, make good economic use of land, and lead to a substantial ease on land acquisition for development programmes.

1.2 Population and Social Concerns

The population of Solomon Islands was 285,176 at the last count in 1986 and has since been growing at an annual rate of 3.5%, one of the highest in the world. In 1994, the World Bank estimated the annual growth rate as 3.2%. It is estimated that the population has increased to 399,684 in 1996 (*Medium Term Development Strategy 1999-2000: Volume 1 – Policy and Strategy – Solomon Islands Government*). This population is fragmented into pockets of communities confined to islands distanced by hostile seas and difficult terrain. This phenomena has led to stretched government resources and its ability to provide equitable essential services. By around 2020, Solomon Islands would have doubled its population, a prospect that present economic trends can hardly match. About 85% of the population live in small and widely dispersed rural settlements, mostly along the coastal areas.

Source: http://www.commerce.com.sb

The unique geography and scattered nature of islands has given rise to a heritage of considerable diversity in cultures and linguistics. About 95% of Solomon Islanders are Melanesians, 4% Polynesian and 1% Micronesian, speaking over 65 different languages.

This diversity had been sustained over the years by communal systems of subsistence furlong and extensive sharing within extended families. However the introduction of the cash economy and a capitalistic approach to productivity has led to changes to the country's socio-economic and political dimensions which have become critical. The problem of forging a national identity through establishing relevant social, communication and economic infrastructures against this background has consumed considerable amounts of government resources and aid money.

Source: http://www.commerce.com.sb

As in any other developing third world country, rapid increases in population within a background of economic stagnancy has led to social insecurity, urban drift, unemployment, and a need to increase law and order. Though incomparable to major happenings in other regional countries, such developments have negative implications on the country's attempts to attract foreign investments. And given that the country does not have the resources on its own to provide some realistic form of social security for its people, population expansion has the real potential to hinder what the country may achieve in terms of economic progress. There will be increased pressure on land and forestry resources which could further aggravate the existing environmental problems of soil erosion and loss of biodiversity.

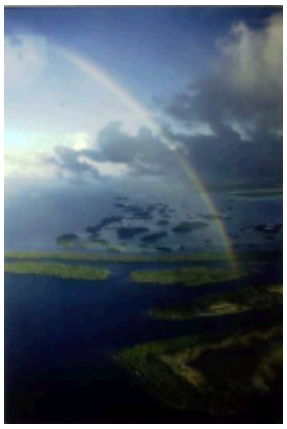
Mid-year Population Estimates and Projections									
1985	1990	1991	1992	1993	1994	1995	1998	2000	2010
273,000	320,000	343,267	356,234	369,691	383,657	398,150	417,800	445,800	612,100

Source: Secretariat of the Pacific Community (website http://www.spc.org.nc)

1.3 Climate

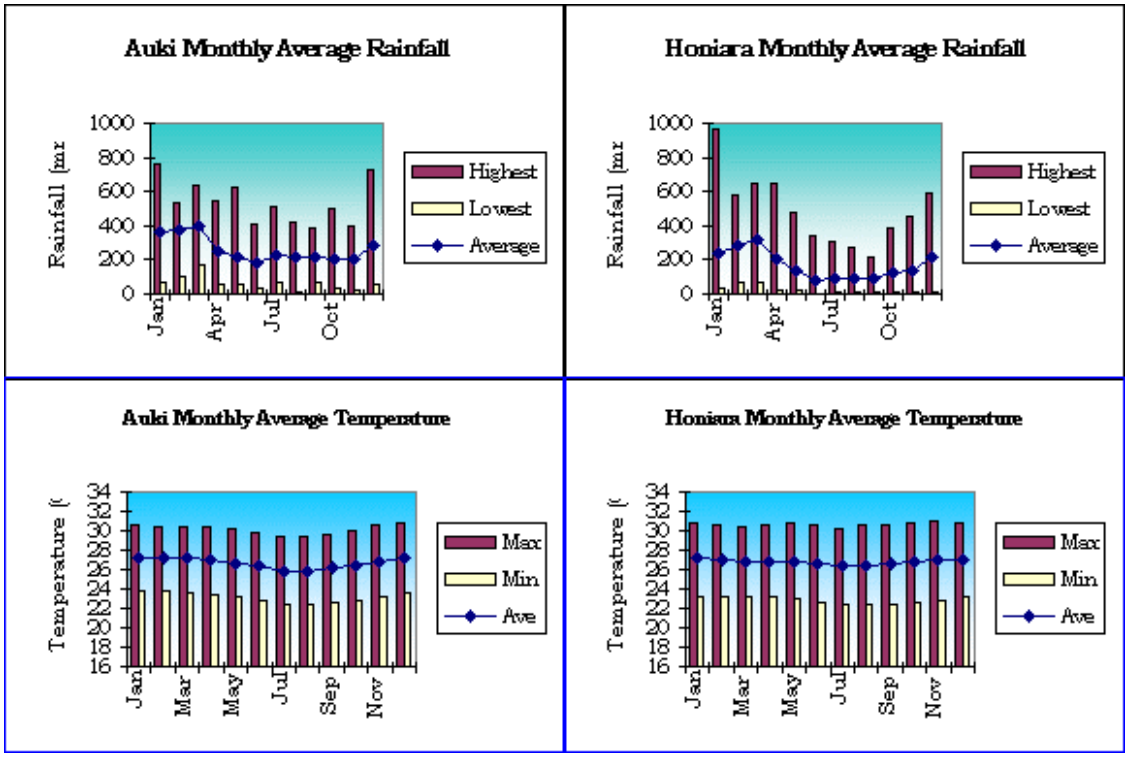
Solomon Islands has a climate that is typical of any tropical region being warm and humid. The temperature shows little variation during the year, with a mean daily maximum temperature of about 30 degrees celsius and a mean daily minimum of about 23 degrees celsius. Rainfall distribution in Solomon Islands varies a lot over space and time. The annual average rainfall is normally within the range 3000 to 5000mm. Often drought in the country is associated with the El Nino Southern Oscillation phenomenon (ENSO).

From about December to March, is a period of west to north-westerly monsoonal winds and abundant rainfall can be expected. This is also a period where tropical cyclones could form and affect the islands. The south-east trade winds (SE trades) blows from around May to October and could trigger higher rainfall particularly on the windward side of the islands.



Source: http://www.commerce.gov.sb

The figures below show typical monthly mean rainfall and temperatures as recorded in most stations in Solomon Islands.



1.4 Recent Economic Development

Solomon Island's real Gross Domestic Product (GDP) contracted by 8% in 1998 due to mixed performances in the forestry and agriculture sectors. This contraction was largely created by fall-out from the Asian financial crisis. This caused a collapse in late 1997 of the country's log markets in eastern Asia as well as significant fluctuations in cocoa and copra productions. Subsequent sharp reductions in the prices of log exports that had been the country's single major export earner in the preceding six years particularly caused a balance of payment crisis that led to a 20% devaluation of the local currency in late 1997. Effects of these performances were partly offset by increased tuna outputs, marginal improvements in the Oil Palm industry, online gold production and a timely inflow of overseas grants and soft loans in support of attempts by the government to restructure the economy.

With the exception of fish export that is being projected to remain stable in 1999, contributions from all other sectors of primary exports, including agriculture exports, are expected to reduce due to predicted declines in prices. These trends will continue to put pressure on an already fragile foreign exchange situation. One positive development anticipated to help ease these projections is the newly opened (August 1998) gold mine on Guadalcanal operated by Gold Ridge Mining Limited. The mine is expected to export 120,000 ounces of gold in 1999 and projected to increase total exports to 160,000 thereafter once the mine's current expansion activities are completed.

In January 1999, the government signed a Memorandum of Understanding (MOU) with representatives of the private sector, the Chinese Association which controls the country's urban retailing sector and Unions, aimed to prolong to year 2000 a wage freeze introduced in 1998 and restrain a rise in prices of basic goods. By effecting the MOU together with careful control on the country's real effective exchange rate, it is hoped that inflation is maintained at reasonable levels to minimise pressures on balance of payments.

Recently the government, through the Central Bank of Solomon Islands (CBSI), introduced appropriate policies aimed at reviving public confidence in the country's financial system. Public confidence which had been lost due to failure of past administrations to service public debts. In particular, the government has taken steps to revive the country's security markets by restructuring its debts to domestic lending institutions in the form of treasury bills into long-term bonds and auctioning securitised government advances with (CBSI). This has been done by rationalising public debts and regularising the servicing of loans. In terms of dividends to the nation, the country's leading bank, the National Bank of Solomon Islands has immediately responded by cutting lending rates in loan categories with prospects of further improvements.

The blue print for recent economic developments has been a comprehensive Reform Programme determined by the Solomon Islands Alliance for Change (SIAC) Government since gaining office in 1997. One of its objectives is to avail maximum commercial freedom to the private sector. This programme has led 450 public service employees who have been made redundant. It has further led to a review of governance institutions, strengthening of pubic finance and privatization of state-owned enterprises with entire proceeds earmarked for debt servicing. These actions together with fiscal discipline and sound management practice are expected to lay the foundation for economic growth in the years ahead to create employment in mining, fisheries, and agriculture.

Gross Domestic Product (GDP) By Year and Percentage Distribution by Sector					
	1991	1992	1993	1994	1995
GDP (million US$)	196.0	223.1	273.8	312.9	357.2
GDP Per Capita (US$)	571	626	740	815	897
Agriculture/Forestry/Fisheries	33.1	35.9	39.9		
Mining	0.3	0.2	0.1	NA	NA
Manufacturing Industries	7.5	6.8	6.0		
Wholesale & Retail Trade	13.2	13.7	13.9		
Transport & Communication	3.7	4.3	4.7		
Utilities	0.7	1.0	0.9		
Construction	3.3	1.2	1.5		
Others	38.1	36.9	33.0		

Source: Secretariat of Pacific Community website http:// www.spc.org.nc

1.5 Water Resources

Water is abundant in the six larger islands of the group. This is in contrast to the many atolls and low-lying islands that barely have access to proper water sources and have to depend on seasonal rain and saline underground tables for replenishment.

Distribution of water particularly in urban centres is carried out by the Solomon Islands Water Authority (SIWA) through ageing networks that have continued to incur high maintenance costs to the authority. Difficulties relating to water in the larger islands are exacerbated by the location of water sources in customary lands that require payments of enormous access fees to landowners by the central government. Present attempts to improve the existing situation of improved water access to communities in rural areas is being funded by the Australian Development Agency under an on-going Rural Water Supply Development Project.

The geographical limitations of water sources effectively confine further usage of water as an energy alternative to the larger islands. Studies conducted on such usage have confirmed that water can be harnessed as alternate energy sources at the national level. Government utilization of water for such purposes has so far been limited to (4) mini-hydro projects located in various locations. Government desires to construct the Lunga Hydropower Project into a major long-term Public Electric Utility over the last fifteen years have been continued to be frustrated by lack of funds.

1.6 Agriculture

The agricultural sector plays a predominant role in the Solomon Islands economy. It consists of a rural mixed-subsistence component and a commercial agriculture component. The two most important subsistence crops grown in the rural areas are cassava and sweet potato. The commercial sub-sector produces mainly palm oil products, copra, coconut oil, and cocoa for the export market. Production in the later sector is done by large-scale plantations, which also provide employment for local communities.

Commercial agriculture has expanded in the last fifty years from a single copra-based system of economies to include other export-driven commodities like oil palm and cocoa with recent demonstration of interests in rice farming and honey production. In 1997, Solomon Islands exported $37million worth of agriculture products, 28% of total national exports. These figures failed to improve in 1998 due to decline in productions

in copra and cocoa with further depressed figures projected for 1999 due to declining trends in prices.

The Oil Palm industry showed marginal improvements in 1998. Productions in this sector have been achieved through Solomon Islands Plantation Limited (SIPL), a joint venture company between the Solomon Islands Government and Development Corporation (CDC) of Britain. SIPL has a 5760 ha palm oil plantation and operates a palm oil processing plant. It has been the only successful joint-venture arrangement that the government has entered into, in terms of consistency in profit generation over its 25 years of existence and providing sustained employment for a large number of islanders. In 1998, SIPL made no major development due to land acquisition difficulties caused by political resistance, customary land ownership difficulties and allocation of appropriate lands for alternate use. Government plans to develop 10,000 hectares (with another 22,000 ha of customary land available for expansion) of Oil Palm Plantations in the Western Province are being reconsidered in light of mixed reactions from the Provincial Government and landowners.

Copra and cocoa productions fell significantly in 1998 resulting in a decrease in sector contributions. The situation is not expected to improve in 1999. Copra and cocoa are produced by the Russell Islands Plantation Estate Ltd (RIPEL) and small holding units in the rural areas and are marketed mainly through the Solomon Islands Commodity Export and Marketing Authority (CEMA). Moves by CEMA to market all copra in semi-processed oil form starting March 1999 plus forecasts that RIPEL would increase its contribution of 20% when a 3,000 hectares of land it is developing in Isabel Province comes on stream are certain to have positive impacts on these two commodities.

Recent interests in rice farming have revived the prospect of rice as an income source for rural dwellers. Currently, an extensive Rice Farming Demonstration programme is underway funded under a bilateral aid agreement between Solomon Islands and the Republic of China (Taiwan). Special emphasis is given under the programme to community oriented methods of cultivation with a transfer of maximum production techniques that could enhance the production of surpluses for cashing.

Subsistence farming of rice and sweet potato. (Source: http://www.commerce.gov.sb

The potential of agriculture in the Solomon Islands seemed only limited by the need for capital, capital that the country has had difficulties in mobilising. The result of this has been that all agriculture development projects rely on overseas funding and where indigenous funds are available, the cost of using these funds is often limited.

1.7 Forestry

Forestry is an extremely important sector in the economy. Forest resources consist of two types, natural forest, which is predominant, and plantation forest, which consist of states planted under the initiative of the government. The natural forest covers about 78% of the country. Currently, plantation estates cover about 43,000 ha.

Solomon Islands managed to reduce its log export in 1998 from a five-year annual average of 750,000 to 600,000 cubic meters. This was achieved through a combination of government fiscal measures introduced to bring logs exports to the established annual sustainable level of 350,000 cubic meters and events in log markets overseas which somewhat discouraged exerted efforts from loggers. The swift occurrence of the above forces measures led to the calculated accumulation of logs in ponds around logging sites forcing the government to readjust its position and allow felled logs to be cleared.

Forestry products particularly logs had been the country's major export between 1993-1997 accounting for a five-year average of 48% of total export and 38% of government revenue. These contributions were forthcoming in spite of a significant loss believed to have incurred on public collections through the granting of remissions. These were done under suspicious circumstances. The ease at which licenses were obtained together with high pricing in log markets provided incentives for alarming rates of log extractions. This subsequently encouraged propensity in the public sector and high dependence on log receipts. Despite the boom in enormous log receipts, the country came out $200 million worse off, not to mention the fact that reforestation parts of licensing had been hardly enforced.

Source: http://www.commerce.gov.sb

In light of past developments in forestry, new legislation is being developed for ratification by Parliament. The thrust of the new legislation is to provide for a better process of acquiring customary land rights. New legislation seeks to ensure that proposed harvest areas are suitable for the purpose to ensure that all parties are fairly treated in all timber sales agreements. It also seeks to ensure that there is responsible forestry practice under a code of practice and has sought to introduce performance bonds to ensure reforestation after logging. These objectives are designed to change

industry and loggers' practices. It also means that proper policing techniques must be formulated to assure compliance.

1.8 Fisheries

The fisheries sector at present contributes about 8 percent of the monetary GDP, and about a quarter of the foreign exchange earnings. The Economic Exclusive Zone (EEZ) of the country, has abundant stocks of migratory species of tuna such as skip jack as well as deep sea stocks of yellow fin, big eye and albacore. The present levels of commercial catch are well below the total attainable catch. There is considerable scope for the expansion of the fishing industry. In addition, more than half of the total population live on the coast therefore inshore fish resources are an important source of livelihood.

As in the case of agriculture, the fisheries sector too has a dual structure: the industrial sub-sector and the mixed subsistence sub-sector. The industrial sub-sector can be further broken down into two components: (a) tuna harvesting by fleets of locally incorporated companies for processing locally and marketing overseas, and (b) tuna harvesting by distant water fishing nations under the US Regional Multilateral Agreement and under bilateral agreements. The mixed subsistence sector harvests inshore fisheries resources include reef fish and crustaceans for own consumption and sale in the local markets.

The industrial fisheries sector harvests tuna in the EEZ. Total catch levels at present seem to be in range of 40,000 to 64,000 tons per year compared to a total catch of 120,000 tons allowed by the government. A stock assessment by the South Pacific Commission in 1992 indicated that the total attainable catch could be higher than the government allowed limit and that the government quota is biologically sustainable. This means that there is much room left for the expansion of tuna fishing industry in the country.

Two companies control the activities of the domestic fishing fleet: the Solomon Taiyo Limited (STL) and National Fisheries Development (NFD). STL was originally formed in 1973 as a joint venture between the government and Taiyo, Fishing Company of Japan, which has changed its name to Maruha Corporation. The company is the largest single private sector employer in the country employing 2100 employees. Although the company has operated at a loss for a long time, it has been responsible for establishing an on-shore based tuna industry in the country that has been able to inject about $88-103 million annually into the economy. The company is fully established and, in accordance with government policy, should now be privatised.

NFD started in 1977 as a joint venture between the government and STL and was fully privatised in 1990. This company too makes a significant contribution to the economy by means of cash injections generated by its operations. The company has expressed an interest in establishing more on-shore facilities including a cannery.

The mixed subsistence sector consists of subsistence fishing and small-scale coastal fishing for cash. For over 50 percent of the population living on the coast, inshore fishing is an important source of sustenance. Due to rapid population growth, subsistence fishing has increased in recent years, although there has been some shift away from the consumption of fresh fish in favour of cheaper, canned mackerel. In addition, about 17 percent of the households in the cash economy engage in fishing for cash. In recent years the government has encouraged small-scale commercial fishing by investing in over 31 fisheries centres throughout the country and by providing

extension services under the EU funded Rural Fisheries Enterprises Project. These efforts seem to have resulted in limited success resulting in a few of those collection centres being used. The government is now in the process of turning over these centres to the provincial governments. However, concerns have been expressed over the long-term viability of the centres, due to inadequate financial resources of provincial authorities to support them and a lack of private sector interest in acquiring them.

Source: http://www.commerce.gov.sb

Over-exploitation and population growth have reduced the opportunity for coastal dwellers to utilise marine resources. Given that the majority of coastal households are heavily dependent on in-shore marine products (e.g. reefs, fish, beche-der-mer etc.) for both their nutritional and cash contribution, it is essential to develop industries that allow the local population to produce goods for both home-consumption and the cash market on a sustainable basis.

1.9 Mining and Minerals

The mining industry in the economy is still in its infancy state and its contribution to GDP has been negative in the past. This indicates exploration activities without a net return as yet. Beginning in 1998 however, the sector should contribute positively to GDP as a result of gold production by the Gold Ridge Mining Company, pouring its first gold from the mine in August 1998. The annual production of the mine is estimated at 100,000 oz of gold and the mine is expected to last 10 years. However, the company hopes to discover more gold deposits in adjacent areas.

As a result of mining legislation passed in 1996 and the opening of the first gold mine in the country, foreign investors have become active in prospecting for gold in the Solomon Islands.

2 NATIONAL ANALYSIS OF THE UNFCCC AND THE KYOTO PROTOCOL

2.1 The United Nations Framework Convention on Climate Change

The United Nations Framework Convention on Climate Change (UNFCCC) was adopted in May 1992 and was signed by world leaders at the Earth Summit in Rio in June 1992. Solomon Islands ratified the Convention on 28th December 1994.

The *"ultimate objective of this Convention" is to stabilize "greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic (human-induced) interference with the climate system." And that "such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner."*

The UNFCCC is the legal agreement that establishes the framework and a process for the international community to agree to specific actions in response to the challenge of climate change. It provides the framework and seeks to establish a global partnership to address the causes and the adverse effects of climate change through their *"common but differentiated responsibilities"*. Through the Convention, countries commit themselves to undertake measures to limit their emissions of greenhouse gases, and to pool financial and technological resources to assist each other in undertaking these measures, and to prepare for the predicted impacts and adverse effects of climate change.

The first Conference of the Parties (COP) reached two important conclusions. Firstly, existing commitments were inadequate and that industrialised countries would not meet their commitments to return their greenhouse gas emissions to 1990 levels by the year 2000. Secondly, actions by industrialised countries alone would not meet the objective of the convention because of developing country emission increases. It was then agreed that industrialised countries would take on legally binding commitments (Berlin Mandate). The Berlin Mandate gave birth to the Kyoto Protocol.

2.2 The Kyoto Protocol

The Kyoto Protocol to the UNFCCC was adopted at the third session of the COP to the UNFCCC in Kyoto, Japan, on December 1997. It enters into force on the ninetieth day after the date on which not less than 55 Parties to the Convention have ratified it. And that those parties include Annex I Parties, which accounted in total for at least 55 % of the total carbon dioxide emissions for 1990. The Kyoto Protocol was signed by Solomon Islands in September 1998.

In the Protocol, Annex I Parties to the UNFCCC agreed to legally binding commitments with a view to reducing their overall emissions of six greenhouse gases (GHGs) by at least 5% below 1990 levels between 2008 and 2012, in accordance with their "common but differentiated responsibilities". The Protocol also establishes "emissions trading", "joint implementation" between developed countries, and a "clean development mechanism" (CDM) to encourage joint emissions reduction projects between developed and developing countries.

2.3 Constraints and Issues in Implementing the Convention

The major constraints in implementing the convention in Solomon Islands were identified to be a lack of financial resources, lack of expertise and trained local manpower, technical know-how, and a lack of relevant data and information.

To effectively implement the commitments under the convention, the developed country parties must meet their commitments under Article 4.2 (a) and (b) and those related to the provision of financial resources, development and transfer of environmentally safe technology to developing country parties as provided for in the various provisions of the convention, including Articles 4.8 and 4.9. The implementation of developing country commitments is conditional upon the actions of developed country parties, as stipulated in Article 4.7.

The climate change problem requires an effective global response with the active cooperation and strengthened action by all countries in accordance with their common but differentiated responsibilities and respective capabilities. But developed country parties must take the lead in combating climate change and its adverse effects. The legally binding commitments in the Kyoto Protocol is a significant first step forward in ensuring effective global action to combat climate change.

2.3.1 Financial Resources

Solomon Islands is a least developed, small island developing state which recognises the adverse effects and impacts of climate change may have on its social and economic development. However, it will not be expected to meet its obligations under the convention unless the necessary financial resources are provided to meet its obligations and to implement the convention. The scarce and very limited financial resources of the government are foremost directed towards the development and maintenance of the essential services in the social and economic development of the country.

2.3.2 Technology Transfer

Solomon Islands uses out-dated and inefficient technology especially in the energy and transportation sectors. Solomon Islands' energy supply is subjected to inefficient generation, transmission and inefficient end-use technology such as air conditioning systems, lighting, industrial machinery, and negligence such that it cannot adequately meet the demand for its energy supply. The transportation sector uses refuge vehicles imported from overseas as re-conditioned vehicles. This causes traffic congestion on the poorly designed road system of the national capital.

The transfer of environmentally sound technology and know-how from developed country parties to developing countries, an obligation under Article 4.5 of the Convention, is critical to the effective participation of developing countries like Solomon Islands in implementing the convention for dealing with climate change. Appropriate and environmentally friendly technologies include those for mitigation of greenhouse gases. In the energy sector these include generation, transmission, high-efficiency end-use, renewable and clean energies such as, hydro, solar and wind as well as those technologies for adaptation to climate change and sea level rise. Adaptation has been identified as one of the key response measures Solomon Islands can undertake to respond to climate change.

2.3.3 Flexibility Mechanisms

The Clean Development Mechanism (CDM) is an economic instrument that may benefit developing countries achieve sustainable development through investments

and at the same time assist developed country parties meet their emission reduction commitments specified in Annex B of the Kyoto Protocol. Although there are many unresolved issues and questions, this mechanism should be the avenue through which Annex I or developed country parties can channel environmentally sound technology and know-how, and financial resources to developing countries for mitigation and for adapting to climate change and sea level rise. As stated in Article 12.8 of the Protocol, those developing countries that are most vulnerable to climate change will also benefit from the share of proceeds accrued to fund or meet the cost of adaptation.

2.4 Opportunities for Implementing the Convention

As stated above, the Convention provides financial support to meet developing country parties' commitments and can be seen as genuine opportunities for developing countries.

There are the opportunities for developing countries[2]:

- To prepare plans for sustainable development in the energy, transport, agriculture and forestry sectors, facilitated by the preparation of the National Communications;
- To develop plans for adapting to the adverse effects of climate change, such as sea level rise and changing agricultural patterns;
- In their national interest, undertake specific projects to mitigate climate change that reduce energy consumption and reliance on energy imports such as:
  - Making improvements in energy efficiency;
  - Shifting to new and renewable energy technologies;
- Building national capacities:
  - through the participation in international efforts to promote training, education and public awareness about climate change and related issues;
  - to participate in international efforts for data collection, analysis, and research in areas related to climate change.

2.4.1 Perceived Benefits

The perceived benefits for Solomon Islands include:

a) Financial Assistance for:

- Compilation of subsequent National Communications: This would involve the inventory of greenhouse gases; identification of data and information gaps and needs; capacity building and training; public awareness and education; identification of mitigation and adaptation options; and assessment of climate change vulnerability and adaptation;
- Funding stage II adaptation by the Global Environment Facility (GEF) as per COP4 Decision, and those funding to be available under the Clean Development Mechanism (CDM) for adaptation of those developing countries most vulnerable to climate change;
- Investments and projects for sustainable development as provided for in Article 12 of the Kyoto Protocol.

[2] *CC:TRAIN Module 4 Understanding and Assessing the Financial Support Provided by the UNFCCC*

b) Technology Transfer for:

- Technologies for Mitigation:
  a) Hydropower: Small-scale hydro-electricity generation had been introduced by the government into the rural areas of Solomon Islands and there is potential for its development in other suitable areas. On a larger scale, there is also potential for hydro-electricity generated in the urban areas of Solomon Islands, and this would substantially reduce the dependence on fossil fuel generated electricity.
  b) Solar Power: This technology is in use in the Solomon Islands mainly for water heating in residential buildings and some government offices in the urban areas. It has also been introduced in one or two villages for lighting and can be adapted as a source of energy for the rural areas.
  c) Biomass: Certain industries are using biomass-generated energy and could be adopted for other industries.
  d) Wind: Solomon Islands has no experience with this technology, but should explore its potential for development in the country.
  e) Energy Efficient Technology: The use of energy-efficient systems and appliances to replace inefficient systems and appliances with high efficiency alternatives. For example, replacing inefficient air conditioning systems and lamps with high energy efficient alternatives.
- Technologies for Adaptation: Options include
  a) Technologies for adaptation to sea level rise and its adverse effects; and;
  b) Technologies that are suitable for adaptation to the various sensitive sectors such as agriculture and fisheries.

2.4.2 Actual Benefits

It is through the financial support of the UNFCCC enabling activities that made it possible to gather the necessary information required for its initial National Communication.

Through the financial resources of the enabling activities, Solomon Islands was able to train personnels to undertake the greenhouse gas inventory using the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventory, vulnerability and adaptation assessment using the IPCC Methodology; promote public awareness and education; and the compilation of its initial National Communication.

The major outputs from the financial resources of the convention's enabling activities and the benefits to Solomon Islands are as follows:

a) National Greenhouse Gas Inventory has been completed using the available data and information;
b) Information and data gaps for greenhouse gas inventory identified and a pilot mechanism for data recording, reporting and collection put in place. This should be reviewed and improved;
c) Public awareness and education workshops for senior government officers, NGOs and private sectors conducted as well as through the media and some provinces and villages;

d) National vulnerability and adaptation assessment undertaken based on available data and information;
e) Regional mitigation options on energy undertaken;
f) Limited capacity building and training of national expertise on greenhouse gas inventory and vulnerability and adaptation assessment;
g) Initial National Communication compiled and submitted to the UNFCCC;
h) National Implementation Strategies will be formulated as a final component of the financial assistance given to Solomon Islands.

Solomon Islands would not have got this far in implementing the convention without the provision of the financial resources under the enabling activities.

2.5 Future National Development and the Implementation of the Convention

Through the financial resources of the enabling activities of the Convention Solomon Islands should put in place a National Climate Change Action Plan, policies and measures that address climate change and integrate it in it's national development plans. The plan will be forward looking with a view of how the country will seek to implement the UNFCCC and what will be required to undertake such actions.

The Action Plan will facilitate the implementation of the country's commitment under the Convention. This will include the preparation of National Communications, integration of climate change considerations into national development planning, relevant sectoral policies, establishing procedures and criteria for identifying and assessing climate change (mitigation and adaptation) projects that meet national needs and to submitting them as CDM or to GEF/UNDP and other potential donors.

3 NATIONAL GREENHOUSE GAS INVENTORY

3.1 Introduction

The sectors focused on this national greenhouse gas inventory were those identified by Pacific Islands Climate Change Assistance Programme (PICCAP). These sectors were prioritize in accordance to needs and their significant importance to each island state of the Pacific countries. In the case of Solomon Islands these sectors were prioritised as follows:

1. Energy sector
2. Land Use and Forestry
3. Industries, Manufacturers, and Construction
4. Agriculture
5. Waste Management

Each sector emits different types and levels of greenhouse gases depending on the environment, types of activities and products used and mechanisms involved. In this inventory, the IPCC default values were used to compute the level of greenhouse gas emissions using the IPCC Guidelines.

IPCC Default Values

Pro Types	Emission Factors ($TJ/10^3$)	Emission Factor (tC/TJ)	Conversion Factor (1ton)
Gasoline	44.8	18.9	1360 ltr
Diesel Oil	42.9	20.2	1190 ltr
Jet Kerosene	44.59	19.5	1412 ltr
Other Kerosene	44.75	19.6	1261 ltr
LPG Gas	47.3	17.2	-

This inventory is timely as it could be used as a learning experience and as a basis for educational and awareness programmes for future inventories. The inventory has provided a lead for systematic information, data collection procedures and guidelines, which should in turn support sustainable social and economic development.

3.2 The Inventory

The PICCAP member countries, were advised to undertake greenhouse gas inventories from 1990 to 1994. However due to unavailability of sourced information, data, time constraints and apathy on the part of some of the stakeholders, the base line for this inventory was confined to 1994.

Record keeping and access to acquiring data from selected sectors has been a major hindrance to the compilation of this inventory. Some of the presumed major sources of data and information, including government departments do not have records or proper recording systems in place. Furthermore, some of the target sectors failed to respond or commit themselves to provide needed data and information. It has therefore been difficult to make a fair representation of greenhouse gas emissions from all the sectors defined by PICCAP. Part of the failure to provide data had been due to a perception that the submission of operation data may compromise business activities.

The two approaches as directed by PICCAP were the basis of this inventory. These two approaches are: Top Down and Bottom Up approaches. The Top Down approach basically refers to producers and in the case of Solomon Islands it would refer to the importers whilst the Bottom Up approach refers to users or the consumers.

Taking into consideration the above mentioned difficulties and problems, it was decided that the national greenhouse gas inventory for Solomon Islands will focus on the energy sector using the top down approach as the basis. It is also believed that the energy sector is the major emitter of greenhouse gases in the Solomon Islands and the only sector with adequate and reliable information and data.

3.3 Methodology

This inventory was based on approaches as determined by PICCAP namely; Top Down Approach and Bottom Up Approach using the IPCC Guidelines and default values.

3.3.1 Top Down Approach

Mobil Oil and Shell Company are the only two companies involved in the importation of fossil fuel. There are no producers nor exporters of fossil fuel in the country. The main fossil fuels imported into the country are the clean fuel categories (gasoline, diesel, kerosene, jet kerosene and lubricants).

In the case of gaseous petroleum fuel (LPG), only information and data from one of the two importers (Boral Gas and BOC Gas) were obtained.

3.3.2 Bottom Up Approach

In the bottom up approach, all of the selected data sources were those identified to be the major distributors, users and consumers of energy fuels, including industries and commercial institutions.

3.3.3 Data Collection Approach

Of the selected data sources from the energy sector, 30% responded positively while the remaining 70% failed to respond or took total disregard of this important inventory.

The general steps in information and data collection from the sources are as follows:

Step 1: *Selection of data sources based on location and access, capacity, size, and type of industry*
Step 2: *Orientation and familiarisation to each data source*
Step 3: *Formulation of the questionnaires*
Step 4: *Face to face explanation*
Step 5: *Issuing of the questionnaires*
Step 6: *Follow up and await response*
Step 7: *Inventory*

3.3.4 Analysis Approach

Step 1: *Collection of data and convert to kilotons to find the apparent fuel consumption then convert to common energy unit (terajoules);*
Step 2: *Use IPCC default values (emission factors) to compute the carbon content;*
Step 3: *Covert carbon oxidised to Co_2 emissions by using IPCC default values of the fraction of carbon oxidised which is 0.99 or 99 for every oil products.*

3.4 Findings And Results

The IPCC Methodology was used to compute the CO2 emissions using the IPCC default values based on the information and data provided for the year 1994. Due to

inadequate information and data certain assumptions were also used in the Bottom Up approach.

Summary of CO_2 Emission from Fossil Fuel in Top Down Approach

Fuel Type	Total Fuel Imported (kilotons)	Apparent Consumption (kilotons)	Apparent Consumption Terajoules (TJ)	Actual CO_2 Emissions (Gg CO_2)	Percentage (%)
Gasoline	16.25	16.25	728	49.95	15.48
Jet Kerosene	4.8	3.3	147.15	10.42	3.23
Other Kerosene	3.62	3.62	162.00	11.53	3.57
Diesel oil	76	76	3293.08	241.47	74.86
Lubricants	2.2	2.2	88.42	6.45	2.00
LPG Gas	0.94	0.94	44.47	2.78	0.86
Total CO_2 Emissions from Top Down Approach (Gg CO_2)				**322.58**	**100**

Note: There was no assumption used in the Top Down Approach as the information and data provided were from reliable sources and therefore indicate true representation of total fossil fuel imported.

Summary of CO_2 Emissions from Fossil Fuel Combustion using Bottom Up Approach

Fuel Usage By Sector	Consumption and Emissions		
	Apparent Consumption (kilotons)	Apparent Consumption Terajoules (TJ)	Actual Emissions (Gg CO_2)
Energy Sector			
Diesel Oil	16.68	722.74	53.0
Lubricants	0.18	7.23	0.26
Transport: Sea, Air, Land			
Gasoline	14.84	664.83	45.61
Jet Kerosene	0.8	35.67	2.53
Diesel Oil	44.84	1942.85	142.47
Lubricants	1.5	60.31	2.18
International Bunkers: Marine and Aviation			
Jet Kerosene	1.5	66.89	4.73
Diesel Oil	0	0	0
Lubricants	0	0	0
Commercial Institutions			
LPG gas	0.33	15.61	0.97
Other Fuel	0	0	0
Agriculture, Forestry and Fisheries			
Gasoline	1.46	65.41	4.49
Diesel Oil	9.2	398.64	29.23
Lubricants	0.21	8.44	0.31
Residential			
Other Kerosene	3.62	162.0	11.53
LPG gas	0.61	28.86	1.80
TOTAL (excluding international bunkers)			**294.38**

Notes:
1. Total CO_2 emissions exclude emissions from international bunkers inline with IPCC reporting Guide lines
2. Avgas and Petrol are included as Gasoline

The total carbon dioxide emissions from the bottom up approach is less than that from the top down approach because diesel oil is also used in various ways which were not accounted for in this inventory. These include its use in rural areas and some educational institutions for lighting, farming and other general uses.

Based on the top down approach it is estimated that per capita emissions for Solomon Islands in 1994 was 0.84 tons of CO_2 from the burning of fossil fuel.

3.5 Assumptions and Estimates

Acquiring information and data using the bottom up approach was difficult due to less response Therefore assumptions were made based on the joint UNDP/World Bank Report (1991) and from the selected sample as follows:

3.5.1 Fishing Industry

Assumptions were based on information from the two established fishing companies and statistics records of outboard motor (two stroke engine) used for small scale fishing.

Further explanation may be found in the Solomon Islands National Greenhouse Gas Inventory 1994.

3.5.2 Timber Industries

Assumptions were based on information from the Forestry Division and Statistics Department on the number of fixed sawmills across the country and the number of chainsaws used by villagers for logging.

3.5.3 Agriculture

Assumptions were based on information and data obtained from commercial fuel users in the Agriculture sector. These were information and data of their current consumption and previous fuel usage.

3.5.4 Electricity Production

Information and data from the Solomon Islands Electricity Authority (SIEA), which is the only electricity supplier, estimated the 1994 fuel usage for some of its power stations in the Provincial Capitals.

3.5.5 Transport (Land)

Poor data recording system for vehicles means that estimates had to be made on the number of vehicles used for transportation (public, private, company), and the number of different types of vehicles and their fuel use.

Diesel Oil Distribution 1994
Total imported: 90478kltr = 76 kilotons

Sector		Assumptions (percentage)	(kilotons)
Transport	Sea (Navigation)	30	22.8
	Land (Road)	29	22.04
	Air (Aviation)	0	0
Agriculture/Forestry/Fisheries		12	9.2
Energy		22	16.68
Others		7	5.28
Total Diesel Imported 1994		**100**	**76**

Gasoline Distribution 1994
Total Imported: 22100kltr = 16.25 kilotons

Sector		Assumptions (percentage)	(kilotons)
Transport	Sea (Navigation)	10	1.6
	Land (Road)	78.2	12.7
	Air (Aviation)	3.1	0.5
Agriculture/Forestry/Fisheries		8.98	1.45
Energy		0	0
Total Gasoline Imported 1994		**100**	**16.25**

Lubricants Distribution 1994
Total Lubricant Imported: 2464kltr = 2.2 kilotons

Sector		Assumptions (percentage)	(kilotons)
Transport	Sea (Navigation)	18.2	0.40
	Land (Road)	50	1.1
	Air (Aviation)	0	0
Agriculture/Forestry/Fisheries		9.5	0.21
Energy		8.2	0.18
Others		14.1	0.31
Total Lubricant Imported 1994		**100**	**2.2**

LPG Gas Distribution 1994
Total LPG Gas imported: 940 tons = 0.94 kilotons

Sector	Assumptions (percentage)	(kilotons)
Commercial/Institutions	35	0.33
Residential	65	0.61
Total LPG Gas Imported 1994	**100**	**0.94**

4 VULNERABILITY AND ADAPTATION ASSESSMENT

4.1 Introduction

This is the first ever assessment carried out in Solomon Islands and is a basis for better understanding of vulnerability, adaptation requirements and priority needs. As an island nation, it is important to understand how the sea level rise will affect and impact on coastal ecosystems, marine resources, low-lying islands and atolls of the Solomon Islands. In addition there is a need to understand how climate change may affect its people, economy, and environment. It is with these broader objectives in mind that this assessment was carried out.

This vulnerability and adaptation assessment is only a first step and it is limited by the available information. It provides a synthesis of the current state of knowledge about the possible effects of and vulnerability to climate and sea level change in Solomon Islands. More importantly, it identifies the gaps and priority needs that are crucial to our understanding of Solomon Islands' vulnerability to climate and sea level change and the priority needs essential for effective adaptation.

As much as this is a statement of what is known about the vulnerability of Solomon Islands to climate and sea-level change it is also a statement of what is not known and what needs to be known.

The methodology used in this assessment is based on the IPCC technical guidelines (Carter et al, 1994). It examined the present conditions and generated scenarios for possible future changes in climate and sea level in Solomon Islands for the years 2025, 2050 and 2100. The scenarios, based on these time horizons are then used to examine the possible effects of vulnerability to climate and sea-level changes on the various areas and sectors identified. These form the basis for identifying the possible adaptation response measures recommended in this chapter for implementation.

4.2 Sensitive Sectors and Exposure Units

While there is a wide diversity of social and biophysical environments within Solomon Islands, there are some particular systems throughout the country that are likely to be sensitive to climate and sea-level change. Those identified as being of greatest importance are: 1) Subsistence and Commercial Agriculture, 2) Human Health, 3) Coastal Environments and Systems, 4) Water Resources, 5) Marine Resources.

4.3 Climate and Sea-Level Scenarios for Solomon Islands

There is presently a lack of regional detail regarding possible future changes in climate and sea level in Solomon Islands. Importantly, there is also a complete lack of any reliable information on how the El Nino/Southern Oscillation (ENSO) and cyclone events might change, as a result of climate change. Given this lack of information the climate and sea-level scenarios presented here are based on the projections released by the Inter-governmental Panel on Climate Change (IPCC) in combination with output from a number of general circulation models (GCMs)[3]. Only annual changes are presented here, although there are variations between months and seasons. In

[3] *These were based on the application of* SCENGEN *(a computer software system developed by the Climatic Research Unit, University of East Anglia, Norwich, UK, that allows the generation of climate change scenarios). The scenario projections in SCENGEN are at a 5° latitude/longitude grid.*

addition, historical analogues, based on the recent El Nino (1997/98) and cyclone Namu (1986), were used.

4.3.1 Temperature scenarios

The years 2050 and 2100 were chosen for projecting the scenarios. Results are presented in the following Table. These are based on the IPCC best guess greenhouse gas (GHG) emissions scenario (IS92a), assuming a climate sensitivity of 2.5°C, and patterns of change from three GCMs (BMRC, CSIRO9M2, and ECHAM3TR). There were only minor variations among the different GCM patterns, with a temperature increase of 0.7°C to 1.1°C by 2050 and 1.2°C to 2.0°C by 2100. In addition all of the results show little variation across the longitudinal range of Solomon Islands.

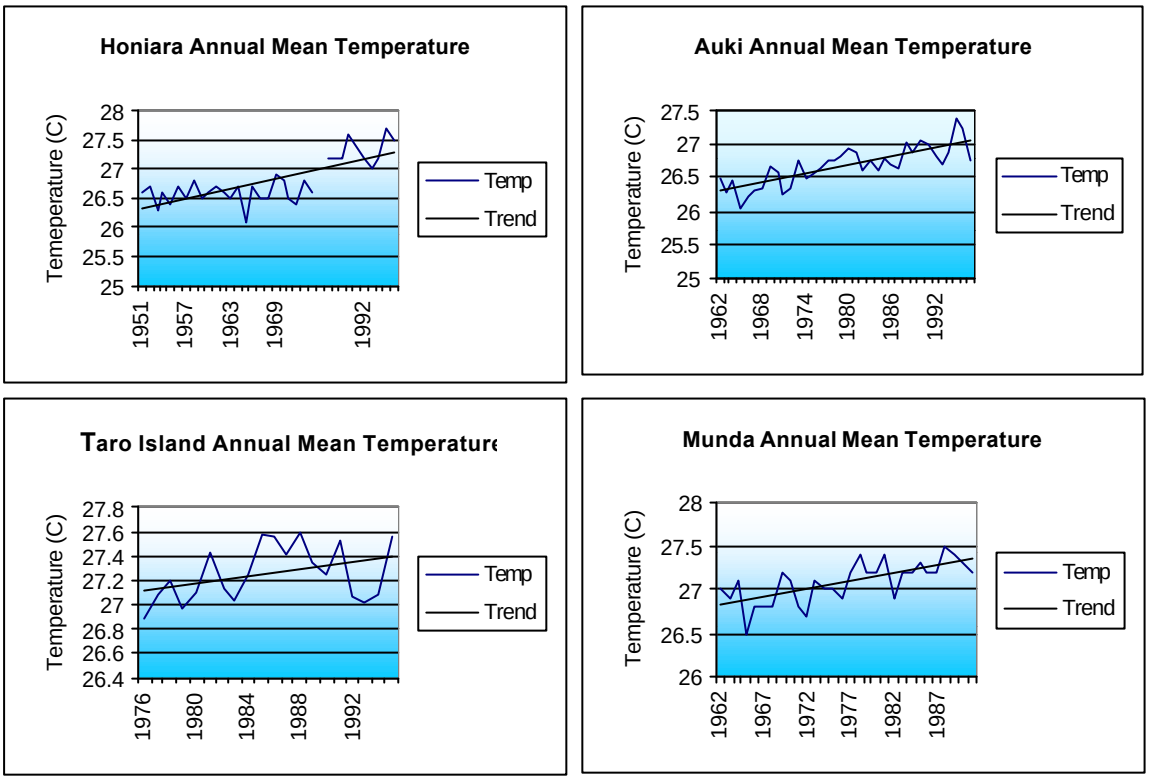
Temperature Scenario for Solomon Islands, based on the IS92a emissions scenario

Projected Temperature (°C) for area Latitude 5 to 10 degrees South, and the given longitudes East					
	Year	Long 155-160	Long 160-165	Long 165-170	Long 170-175
BMRC	2050	0.7	0.7	0.7	0.7
	2100	1.4	1.2	1.2	1.2
CSIRO9M2	2050	0.8	0.8	0.8	0.8
	2100	1.4	1.5	1.5	1.5
ECHAM3TR	2050	1.1	1.1	1.1	1.1
	2100	2.0	2.0	2.0	1.9

Solomon Islands' temperature data (for some locations) are plotted below with trend lines shown on them. The temperature plots suggest increasing annual mean temperature trends of 0.14°C to 0.28°C per decade (0.7°C to 1.4°C every 50 years), an average of 0.2°C per decade. The southwest Pacific "…*as a whole has warmed at a rate of about 0.2°C per decade…" (IPCC: Regional Impacts of Climate Change – An Assessment of Vulnerability, p 339)*

The GCM temperature projections (given above) are consistent with historical temperature trends shown below.

Temperature trends for locations in Solomon Islands



4.3.2 Rainfall scenarios

Rainfall scenarios were developed for the same time horizons (2050, 2100), the same emissions scenario and the same GCM patterns used for the temperature scenarios. The rainfall scenarios presented here show only small variations in rainfall over the Solomon Islands, ranging from minor decreases (BMRC) to relatively small increases (CSIRO9M2 and ECHAM3TR). As with the temperature scenarios there is little variation across the longitudinal range of Solomon Islands.

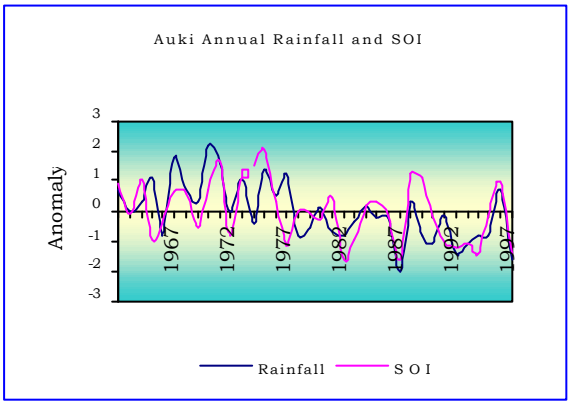
Rainfall Scenario for Solomon Islands, based on the IS92a emissions scenario

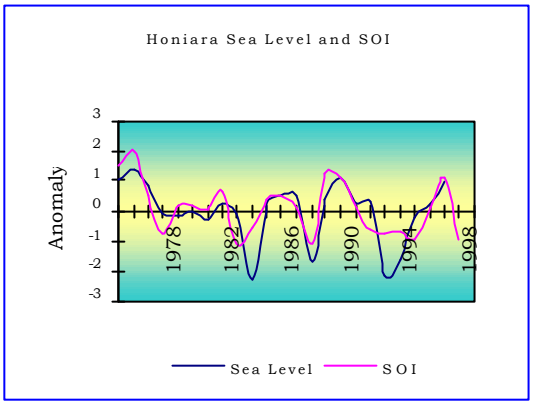
Projected precipitation (%) for area Latitude 5 to 10 degrees South, and the given longitudes East					
Regional Pattern	**Year**	**Longitude 155 – 160**	**Longitude 160 – 165**	**Longitude 165 – 170**	**Longitude 170 – 175**
BMRC	2050	1.0	0.2	-0.1	-0.4
	2100	1.9	0.3	-0.1	-0.7
CSIRO9M2	2050	2.0	2.3	2.5	2.2
	2100	3.6	4.2	4.6	4.1
ECHAM3TR	2050	4.5	4.1	3.9	3.7
	2100	8.2	7.6	7.2	6.7

4.3.3 Extreme events

Though there is no clear evidence of what the future might hold for extreme climatic conditions, the IPCC has noted that "… small changes in the mean climate or climate variability can produce relatively large changes in the frequency of extreme events." (IPCC: Technical Summary – Climate Change 1995, The Science of Climate Change). Other reports have implied that "..in some regions where good data are available, there have been some significant increases and decreases in extreme events over time" (UNEP/WMO: Common Questions about Climate Change p.19). In the present, both tropical cyclones and ENSO events can have severe impacts in Solomon Islands.

The ENSO phenomenon causes significant climatic variations in Solomon Islands. El Nino events typically result in low rainfall, increasing the risk of drought. The 1997/98 El Nino brought severe drought conditions to most parts of the country.





The above figures show the variation of annual rainfall and sea level anomalies with the southern oscillation index (SOI). From the plotted data, it is evident that the El Nino Southern Oscillation causes significant changes in rainfall and sea level.

4.3.4 Sea-level rise scenarios

The possibility of increased thermal expansion of the oceans, and the possible inflow of melting glaciers and ice caps as a consequence of global warming, may result in sea-level rise in Solomon Islands. Given the lack of any regional detail the global IPCC projections were used, although these will vary in different regions of the world and be influenced by factors such as vertical land movement. The IS92a, best guess projection gives a global sea level rise of 20cm and 49cm for 2050 and 2100 respectively. Tropical cyclones and ENSO events are also used as analogues for examining effects of storm surges and local sea level variations respectively.

It must be emphasised that none of the above scenarios are predictions of future climate and sea level for Solomon Islands. They are used here as a basis for asking "what if" questions about the sensitivity of the country to future changes in climate and sea level

4.4 Effects of climate and sea-level change

The main limitations to a comprehensive understanding of the effects of climate and sea-level change in Solomon Islands are: the lack of quantitative data; the limited analytical capability; and absence of previous studies. However, despite these limitations it is possible to make some qualitative statements based on present knowledge.

4.4.1 Subsistence and commercial agriculture

Climate conditions have a strong influence on both subsistence and plantation agriculture in Solomon Islands. At present there is insufficient information to make any quantitive assessment of the effects of climate and sea-level change on agriculture. However, it is possible to make some qualitative judgements based on the effects of climate variability and extremes, and to link these to the scenarios, which have been developed (section 4.3).

Subsistence food crops are already adversely affected by extreme events like droughts and cyclones. Any increase in frequency or intensity of extremes in the future could lead to lower crop yields. In the coastal lowland of Makira taro production has been reduced (less tubers and lower yields) in some recent years because of wave overtopping and drier conditions. During the 1997/98 El Nino event, some parts of the Solomon Islands experienced food shortages in crop production and water shortages, that they were declared national disaster areas. Thus, drier conditions under climate change would lead to increased losses in production of important crops such as taro and kumara. Additionally, salt-water intrusion and flooding in low-lying coastal areas would further reduce yields.

Plantation agriculture in Solomon Islands has also been affected by these extreme events. For example, Solomon Islands Plantation (SIPL) experienced serious losses to oil palm production as a result of the heavy flooding and wind damage from cyclone Namu. Any increase in cyclone frequency and severity could have serious impacts on palm oil production, particularly given the fact that it took ten years to recover from the effects of cyclone Namu.

Subsistence and plantation agriculture in Solomon Islands depends heavily on good quality land. However, if there is going to be loss of land (through sea level rise) and reduced quality of land (e.g. through erosion) the agriculture sector will be significantly affected.

4.4.2 Coastal environments and systems

There have been very few quantitative studies on coastal environments and systems in Solomon Islands. This section is based on a case study in Gizo, for which some limited, qualitative information was available, as well as on studies in the wider Pacific islands region and island states internationally.

Flooding and inundation

The lack of high resolution contour data and data on vertical land movement are serious impediments to any detailed quantitative analysis of flooding and inundation risk.

Gizo has been identified as one area at risk. As a high island, it has coastal areas typical of other sensitive areas in Solomon Islands. It has experienced flooding and inundation in its lowland areas, which are mainly associated with seasonal storms, high tides and storm surges, associated with tropical cyclones. The effect of sea level

change combined with storms and cyclones could pose an even higher risk of flooding and inundation.

Areas of highest risk in the Solomon Islands are the low-lying islands and atolls including Reef Islands, Ongtong Java and Sikaiana. Sea level rise alone, with no change in climate variability, would increase the risk of flooding and inundation. It is possible that in the extreme case these islands will become uninhabitable.

Coastal erosion

Coastal erosion is already evident in many parts of the country. In Gizo this is affecting Malakarava village. Protective works along the shoreline have been eroded and the situation now is that parts of the road passing through it have been washed out. This process has been observed over a number of years but at a faster rate in recent years. In addition the erosion of the road is particularly worsened by rainfall runoff from the steep hill over-shadowing the village (Douglas M Rearic 1991). If it were not for the outer ridge of the reef, which acts as a buffer for the stronger wave energies, the erosion would be more severe and have affected the village.

Coral reefs

At present there is very limited information about the effects climate and sea level change on coral reefs in Solomon Islands. Coral reefs are important in Solomon Islands as they are the main source of sediment for beach formation, provide protection from storm events and are productive habitats and ecosystems. During the recent El Nino there were lower sea levels, which resulted in warmed coral habitats and coral bleaching in some parts of the country, particularly in the Western Province. As sea surface temperatures already frequently exceed the temperature tolerance of coral species (25°C to 29°C), it is likely that any increase in sea surface temperature will result in more frequent and severe episodes of coral bleaching.

Mangroves

In 1976 the total area of mangrove forest throughout Solomon Islands was approximately 650 km^2 (National Environment Management Strategy 1993). However, no recent information on distribution and condition of mangroves exists. The possible effects of sea level rise on mangrove systems in Solomon Islands are poorly understood.

4.4.3 Human Health

Falciparum and vivax malaria are endemic in Solomon Islands and eradication efforts have had little success. The life cycles of both mosquitoes and malaria parasites are dependent on climatic conditions. Rainfall is important for the mosquito life cycle; hence it has an effect on the mosquito population. Most importantly, temperature influences the rate of parasite multiplication in carrier mosquitoes as well as mosquito biting rates. Thus, overall temperature strongly influences epidemic potential. Higher humidity increases mosquito longevity. It is anticipated that the projected increases in temperature will increase the incidence of malaria in areas already affected. Furthermore, it is likely that mountain areas of islands like Guadalcanal and Makira where malaria is known to be relatively low would likely experience an increase in incidence. Higher temperatures may also favour an increase in incidence of the more dangerous falciparum malaria.

Extreme events such as cyclones and flooding have several direct negative effects on public health including loss of life, injury and outbreaks of cholera and other diarrhoeal diseases. Conversely, deteriorated water quality and quantity under drier future conditions may result in an increase in diarrhoeal disease.

4.4.4 Water resources

Climate change is likely to affect both water quantity and quality in sensitive areas of Solomon Islands. Present scenarios for Solomon Islands suggest little change in future annual mean rainfall in the Solomon Islands and thus imply that climate change would have minimal effect on water resources.

However, in the past events such as El Nino have had significant impacts on water sources in some part of the country. The worst was during the 1997/98 El Nino where many areas of South Guadalcanal, Malaita and Western Province, including Gizo Town, suffered water crises. Thus, any decrease in average future rainfall or increase in drought frequency or length would adversely affect water supply in such areas.

Sea level change may result in salt-water intrusion of the important fresh water lenses of the low-lying islands and atolls. This would be worsened by flooding and inundation.

4.4.5 Marine resources

There is presently little knowledge about the effects of climate and sea level variations on marine resources. What is known presently is that the distribution of tuna stocks is affected by sea surface temperature variations. The changes in sea surface temperature and ocean currents associated with the 1997/98 El Nino reduced the Solomon Islands tuna catches. If average sea surface temperatures change in the future diminished catches might occur more often. A more detailed study of the fishery resource, both in Solomon Islands and regionally, and the effect of sea surface temperature changes is required.

4.5 Effects of socio-economic and Environmental Changes

The rapid environmental and socio-economic changes presently occurring within Solomon Islands will continue into the future, and will have effects even in the absence of climate and sea-level change. Thus, t is important that any effects of climate and sea-level change are interpreted within the context of these on-going non-climatic changes.

4.5.1 Subsistence and commercial agriculture

Due to a rapidly increasing population in Solomon Islands, and the increasing development of infrastructure, especially in Guadalcanal, land for subsistence and commercial agriculture is decreasing. Concurrently there are growing conflicts over customary ownership of land. The continued population growth particularly in Guadalcanal and Malaita, will continue to increase pressures on existing land used for both subsistence and commercial agriculture. This could result in reduced productivity and negative effects on both the cash and subsistence economy. If climate change also leads to low crop production there could be serious effects on the economy, health and well being of the people. One consequence would be increased dependency on imported food, which in turn would have continued negative impacts on subsistence food production.

4.5.2 Coastal environments and systems

The projected increase of people living in coastal areas including low-lying areas at risk of inundation and flooding will place more people at risk from the effects of sea-level change and the associated increased risk of flooding and inundation from cyclone events. It is likely that increasing infrastructure in these areas will result in more risk of infrastructure damage and potential for loss. Conversely, increased population and environmental pressure on sensitive coastal environments including mangroves and coral reef systems will worsen the effect of climate and sea-level change on these

systems and consequently may enhance potential for flooding and inundation. Likewise, increased population and land pressure in upland areas could lead to enhanced erosion and sediment run-off resulting in negative effects on coral reef systems, but possibly enhancing the ability of mangroves to keep up with projected sea level rise.

4.5.3 Human health and well-being

Increasing population, numbers and densities would enhance the spread of communicable diseases and transmission of malaria. A continued shift from traditional, subsistence diets to increased dependence on less nutritious, imported, food could be accelerated as a consequence of the effects of climate change. Continued economic and social changes could lead to breakdown of extended family and traditional coping mechanisms (such as sharing and reciprocity) in times of trouble, such as during droughts and after cyclones. In addition, informal settlements and overcrowding could increase the potential for health effects arising from cyclones.

4.5.4 Water resources

The continued population growth will continue to increase demand for good quality water. Increased urbanisation in Honiara and provincial centres will place increasing demands on their water supply systems, which would be exacerbated by, for example, any increase in drought risk. Similar effects could arise from growth in industrial activities.

Continuing land use changes could negatively impact on water catchments and supply systems, resulting in the potential for more severe impacts from both droughts and floods.

4.5.5 Marine resources

Because the majority of Solomon Islanders are coastal dwellers they depend heavily on marine resources to meet their subsistence food needs. The rapidly growing population, combined with continued development of a cash economy will place increasing pressure on marine resources. The tuna fishery is an important contributor to the Solomon Islands economy. Thus, over-fishing of this important resource combined with possible reductions in catch sizes from oceanic temperature and circulation changes, as experience in the recent El Nino, could strongly impact on the viability of the tuna fishery and thus the economy.

4.6 Vulnerability and Adaptations

The vulnerability of Solomon Islands to adapt to the effects of climate and sea-level change will largely be determined by its ability to address on-going socio-economic and environmental changes. Thus, the most appropriate and effective adaptation measures and strategies are most likely to be those that will be beneficial even in the absence of climate and sea-level change. Such measures and strategies could be considered as "no-regrets" adaptation options.

4.6.1 Sectoral adaptation measures

A range of sectoral adaptation measures has been qualitatively assessed, based on economic and environmental cost, cultural suitability and practicability. Each of the measures is discussed below.

Subsistence agriculture

- The breeding and introduction of salt-water tolerant root crops would be a high cost but effective adaptation measure in sensitive lowland areas. Likewise,

breeding more drought resistant cultivars and crops would be an effective adaptation measure in drought affected upland areas.

- Improved soil and water conservation practices in both drought and flood prone areas would help maintain productivity and thus food security.
- Intercropping and crop diversity would increase the resilience of subsistence agriculture in both coastal and upland areas of the main islands as well as be of benefit in other less stressed areas of the country.
- New technology, such as hydroponics, is likely to be a very high cost and impractical adaptation measure for subsistence farmers.

Commercial agriculture

- Diversification to a wider range of plantation crops will spread the risk of loss from climate variation and extremes.
- Extending plantation crops, in particular the oil palm plantations to other islands would spread the risk of production loss as a consequence of extreme events such as cyclones.
- Flood protection of plantation lands would be very expensive and most likely impractical.

Coastal environments and systems

- Protection of mangrove areas and sensitive coral reef systems would help increase the ability of these systems to cope with the stresses of climate change and sea level rise. It will also maintain the natural storm and erosion protection that they offer and their productivity as a resource.
- In the heavily populated coastal areas of the high islands such as Makira, Malaita and Guadalcanal foreshore protection measures, including revegetation and establishment of setback zones would be the most cost effective adaptation measures to protect against erosion and flooding.
- Establishment of sea walls is a high cost option, which would only be of value for very specific areas and would be impractical on a large scale.
- Resettlement options may become necessary for some areas but because of their high social, environmental and economic cost would only be considered as last resort options.

Human health

- Malaria awareness programmes are essential to reducing the public health risk of malaria. This is a low cost option, which is already on-going.
- The use of bed-nets as protection against malaria have proven to be effective in association with awareness programmes.
- Based on past experience, mosquito eradication would be a highly impracticable option. With present methods it would incur a very high financial and environmental cost, with no guarantee of success.
- Reduction of mosquito breeding sites within towns and villages, would reduce the local malaria risk with the added benefit of improving the environment.
- The improvement of medical services is a high priority already for Solomon Islands. This depends largely on foreign aid at present, but it is of high benefit to local communities.

Water resources

- Improved management and maintenance of existing water supply systems would help reduce losses and ensure better quality water. This is a low cost measure that ought to be on-going throughout the country.
- Increasing the water storage capacity through the use of water tanks and small-scale dams is expensive, but would help protect against times of shortage such as can occur after cyclones and during droughts.
- Catchment protection and conservation are important, relatively low cost, measures which will help prevent depletion of sources
- Centralised water treatment to improve water quality is viable for urban centres, but at a village level more cost-effective measures would need to be considered.
- Identification of alternative surface and ground water sources for higher risk areas such as the low-lying islands and atolls

Marine resources

- The extension of marine breeding and re-stocking programmes, such as ICLARM's Coastal Aquaculture Centre at Aruligo, would increase the sustainability of inshore marine resources.
- Establishing marine reserves would help protect subsistence fish stocks and coastal marine ecosystems.
- The encouragement of subsistence fishing practices for all fishes through out the islands, by training.
- A monitoring and quota system for tuna, if effectively implemented, would help prevent over-exploitation of this valuable resource and would be a buffer against climate related stresses. The tuna management strategy that has recently been drafted might be a potential system to maintain sustainability.
- A comprehensive inventory of marine resources would help determine the extent to which marine living resources would be affected by climate and sea level change.

4.6.2 Adaptation response strategies

Specific measures for adapting to the effects of climate and sea-level change can only be implemented effectively if a number of measures are taken that are also aimed at addressing the wider development issues. These measures include:

- Development of a national policy framework
- Capacity building and institutional strengthening
- Public awareness and education

National policy framework

Solomon Islands need to develop a national policy framework that places a high priority on managing the effects of environmental and social change within development planning. Such a framework should be explicitly designed to ensure that implementation of no regrets adaptation measures are incorporated in development planning. Some of the key priorities for inclusion in a national policy framework include support for:

1. A sustainable land management plan
2. An integrated coastal zone management (ICZM) plan
3. A fisheries management plan
4. Effective environmental and social impact assessments on all development projects and plans

Capacity building and institutional strengthening

The establishment of a national climate change unit, which builds directly from the Pacific Islands Climate Change Assistance Programme (PICCAP), would ensure continued development of expertise and skills necessary for furthering present understanding of vulnerability and adaptation to climate and sea-level change.

Institutions important for effective implementation of adaptation measures should be identified and strengthened through capacity building.

Public awareness and education

A national policy framework and strengthened institutions will only be effective if they have support from the public. For the public to provide such support, it is important that they actively participate in decision-making at the community level to ensure that their social and cultural well-being is taken into account. A national policy framework should be as much driven by the needs of local communities as it is by the needs of the country at large.

No regrets adaptation approaches can only work with active community participation. The traditional knowledge and wisdom of local communities should be made use of as much as possible. Community awareness and education programmes need to be developed and implemented which facilitate an understanding of climate and sea-level change and how it relates to sustainable management of community resources in the present.

4.7 Vulnerability of Solomon Islands to Climate and Sea-level Change

Solomon Islands is experiencing rapid environmental, economic and social change at present. These changes are occurring in a very diverse and complex environment. This diversity and complexity has both strengths and weaknesses when considering vulnerability to climate and sea-level change. Many of the adaptations identified above could be effective, but at present not enough is known about effects, it isn't known how effective different adaptations might be, and there are presently major constraints to their implementation. Consequently, at this stage it is difficult to quantify the vulnerability of Solomon Islands as a whole. However, different vulnerabilities will relate to:

Vulnerable islands – Some of the higher islands, which are presently experiencing the greatest environmental, economic and social changes, makes them vulnerable to possible climate and sea-level change. The low-lying islands have low populations, but have a high physical vulnerability to sea level rise.

Vulnerable areas on islands – There are a number of vulnerable areas in different parts of the country, including: deforested upland areas with degraded soils and water resource problems; developing urban and peri-urban environments; and high-density coastal settlements.

Vulnerable ecosystems – The most vulnerable ecosystems are likely to include: indigenous forests; less diverse agro-ecosystems; coral reefs; mangroves; and marine ecosystems.

Vulnerable people – At the village level, the traditional system is the extended family system. Both this and the Wantok [4]system are strong coping mechanisms in times of stress. Those moving away from the extended family and the Wantok system, particularly the young generation, are already more vulnerable.

4.8 Gaps and priority needs

The understanding of climate and sea-level change effects, and vulnerability and adaptation in the Solomon Islands has been constrained by significant limitations of information and knowledge. Important gaps and priority needs are identified below.

4.8.1 Information, knowledge gaps and needs

The most important gaps in information and knowledge are noted below.

Gaps related to present conditions in Solomon Islands

There is a need for:

- Understanding and documentation of land use practices and change throughout Solomon Islands;
- Detailed high resolution contour data and vertical land movement data, particularly for coastal regions;
- Surface climate data;
- Information on, and understanding of, erosion processes and sediment production, transport and deposition;
- Information on forest and mangrove cover and their present conditions;
- Population and migration detail for the country and local areas.

Gaps related to climate and sea-level change scenarios

There is a need for:

- Detailed regional projections of future changes in climate and sea level;
- Information about possible changes in cyclone frequency and/or intensity in the future and possible changes in features of climate variations such as El Nino.

Gaps related to determining effects of climate and sea-level change

There is a need for:

- Understanding of Solomon Islands' coral reef systems and their sensitivity to both climate and sea-level change;
- Detailed information about optimum climatic conditions for subsistence agricultural crops (e.g. taro) and cropping systems;
- Knowledge and information about the effects of climate and sea level variations and ocean currents on marine resources, in particular the tuna fishery;

[4] *A mode of social identification but literally means "*One Language*"*

- Understanding of the interactions and feedbacks between sectors and exposure units and their interactions with the effects of non-climatic changes including an understanding of indirect social and economic effects and cumulative effects.

5 MITIGATION ANALYSIS

5.1 Introduction

This chapter presents an overview of the country's possible climate change mitigation options. These options identify the opportunities and possible actions to limit and reduce emissions from the supply and utilization of energy, and enhancing sinks of carbon dioxide.

5.2 Emissions and Mitigation

Solomon Islands produces carbon dioxide as a major greenhouse gas predominantly from the use of imported petroleum fuel products for its various energy requirements. National figures on fuel imports and consumption put the country's production of carbon dioxide at 322.6 kilotons in 1994. The country's energy requirements have increased since 1994 and are projected to increase. This will result in increases in fuel imports and carbon dioxide production and hence the present energy supply arrangements and energy users should integrate mitigating objectives into their operations.

The underlying strategic approach to limitation and reductions of emissions is primarily centered on the generation of energy from the use of petroleum products. At the usage level, attempts to address this fuel base will particularly involve considerations on user consumption attitudes and behaviors and the need to adopt less-usage oriented techniques. In essence, limitation and reduction of greenhouse gas emissions in Solomon Islands may be achieved through the use of new and renewable energy sources, energy efficiency and conservation, and end consumers' attitude and behaviour.

5.3 Relevant Policies

Solomon Islands has no policy that deals directly with issues relating to mitigation of climate change, apart from the existence of government statement of policies on the energy and forestry sectors that appear to have some relevance to climate change. These policies expressed national interests to "…*the need to develop its renewable energy potential*…", *"…the urgent need to start phasing out large-scale logging operations…"* and *"... A scheme will be established to assist resource owners carry out reafforestation in logged areas."* The valuable information contain in this document will become the basis of responsive policy actions that will enable the country to appropriately deal with issues that concern climate change.

The Government Medium Term Development Strategy 1999-2001 further has policy actions directed to the construction of micro hydro projects in the rural areas as well as exploring the possibilities of introducing solar powered energy projects. And that the government will take action to reduce the current levels of harvest (forests) to a sustainable level by the end of 2001 and will continue to encourage and facilitate reforestation projects. The government also has policy actions to improving the efficiency of the Solomon Islands Electricity Authority (SIEA) and exploring the possibility of privatising it.

5.4 Energy Sector

Solomon Islands is dependent primarily on the combustion of fossil fuels for generating electricity. The demand for power in Honiara, the capital of Solomon Islands, has been increasing rapidly and as a result, since 1996 the power plants have not been able to keep up with the demand. The current power generating capacity in the capital is 14.5 MW and current peak load demand has risen to 9.7 MW. Recently an explosion in the power plant reduced the power generating capacity to 10.2 MW, just equal to the peak load capacity. The only mining company in the Solomon Islands is generating its own electricity with a power capacity of 11 MW and a peak load of 8 – 9 MW. Thus the current combined power generation capacity for Honiara should be in the order of 30 MW and hence insufficient.

Problems in electricity generation include lack of a reliable power supply due to poor management and the unreliability of the aged generators. This dependence on fossil fuels for energy generation has been largely encouraged by the high costs involved in acquiring alternate energy sources and the absence of appropriate infrastructure and technological means in the country. The use of conventional petroleum fuel for energy is crucial to economic developments in this country despite the difficulties faced by the present system in assuring reliable supply. This situation has been compounded by lack of commercial incentives for development machineries to integrate alternative sources into the supply arrangements.

Over a period of 12 years, successive Governments have attempted to effect this shift through the development of the Komarindi/Lungga Hydro Power Project (KLHP). This project has however continued to be prolonged due to difficulties relating to costs. On completion, this project would have consumed considerable amount of funds. On the other hand, the potential to save is enormous. Savings to the country in the long term will come from considerable reductions in the country's massive petroleum import bills. In terms of greenhouse emissions, the KLHP project has the potential to reduce emissions of greenhouse gases from the combustion of fossil fuel for energy in the capital by almost a 100%. The KLHP project is to construct a 25 MW hydroelectricity power plant, with an average energy output of 170GWh per annum.

Proper regulation of power consumption has some relevance to mitigation in as far as enhancing efficient use of power. This requires increase supervision at the appliance level and equitable spread of consumption so as to achieve planned load patterns in the existing generator systems.

The Solomon Islands Electricity Authority (SIEA), which is responsible for the generation and distribution of electricity in Solomon Islands has taken the initiatives and introduced 'metered electricity'. The strategy re-enforces the cash value of electricity and the positive implications of efficient usage techniques. This particular approach needs wider casting of its potential effects on unit spending particularly at the domestic levels. A basic understanding of the implications on national fuel savings due to such individual approach will re-enforce the importance of these techniques.

A pilot project to install time control switches in lighting and air conditioning and simple conservation methods led to a 30% reduction in electricity consumption. The application of these measures to all government buildings and the rest of the community could substantially reduce electricity consumption (CBSI: Annual Report 1997 p.25).

5.5 Options for Mitigation

It is important that governments undertake the role to encourage the deployment of climate friendly technologies through research and information programmes, training, public awareness and education programmes. The use of new and renewable energy and efficient technologies can limit and reduce greenhouse gas emissions and lead towards a sustainable energy economy.

5.5.1 Energy Efficiency and Conservation

a) Lighting

Lighting is a major energy consumer in buildings and there is potential for making energy savings and reducing CO_2 emissions. This may be achieved by replacing inefficient lamps with high efficiency alternatives. Where efficient lamps have been installed, improvements can still be made by the use of timers and dimmers, and other means of conserving energy.

b) Air Conditioning

Air conditioning in government offices and business houses can be a major source of energy consumption in Solomon Islands. It is possible to reduce the amount of energy consumed in air conditioning by proper maintenance and introducing more efficient air conditioners with controls that allow the system to shut down when the system is not needed.

c) Refrigerators

Refrigerators are common source of energy consumption in residential and government buildings. New refrigerator efficiency has been improved dramatically in the major markets and energy savings can be made by the diffusion of this technology into Solomon Islands.

5.5.2 Renewable Energy Technologies

a) Hydro-electricity

Small-scale hydro-electricity generation had been introduced into the rural areas of Solomon Islands and there is potential for its development in other suitable areas. On a larger scale, there is also potential for hydro-electricity generated in the urban areas of Solomon Islands, and this would substantially reduce the dependence on fossil fuel generated electricity, particularly in the Capital.

b) Solar Thermal

Solar thermal is in use in the Solomon Islands mainly for water heating in residential buildings and some government offices in the urban areas.

c) Solar PV Technology

This technology has been introduced to several villages for lighting and powering radios and refrigerators. This technology has the potential for adoption as a major energy source for the rural communities in the Solomon Islands.

d) Biomass

Oil palm and copra industries in the Solomon Islands is using limited bio-mass generated electricity in their operations and the technology could be adopted to other similar industries.

e) Wind

Solomon Islands has no experience with this technology, but would explore its potential for development in the country.

5.5.3 Enhancing Greenhouse Gas Sinks and Sustainable Land Management

The proper management of forests and vegetation cover, including sustainable land management and use in the Solomon Islands could benefit the environment as well as protect and enhance sinks of greenhouse gases.

The Solomon Islands Government has policy actions to:

a) reduce current levels of harvest to a sustainable level through current moratorium now in effect on the issuing and renewal of licenses, revise existing law on forestry, and establishment of a National Conservation Trust Fund for funding protection, conservation, replenishment and development of exploited natural forest resources;

b) achieve higher levels of efficiency in forestry harvest and reducing adverse environmental impact to a minimum;

c) privatise plantation estates in order to improve their management; and

d) continue to encourage and facilitate reforestation projects.

5.5.4 Ground Transport Sector

It is realized that appropriate policies and measures be put in place to control and regulate the importation of automobiles and vehicles meeting certain specifications and standards with preferences for efficiency and environmentally friendly vehicles.

6 PUBLIC AWARENESS AND EDUCATION TRAINING AND CAPACITY BUILDING

6.1 Introduction

Article 6 of the Convention makes provision for the issues of education, training and public awareness. All parties are encouraged to promote activities to give the general public a better understanding of climate change and its effects. It requests all parties to cooperate in and promote the development and implementation of education and training programmes, including the strengthening of national institutions and training of experts in the field of climate change. A well-informed public should render the support for policy measures to deal with climate change and should also foster public participation in measures related to climate change.

6.2 Public Awareness and Education

In Solomon Islands, public awareness on climate change is limited to the urban centres, constrained by lack of financial resources and available trained personnel. Public awareness and education programme on climate change is necessary to inform the general public on the causes, impacts and effects of climate change, as well as the possible measures that can be undertaken locally, nationally, regionally and internationally to mitigate and respond to climate change. These programmes should be on going, targeting the rural population, schools, senior government officers, policy and decision makers.

The majority of people (85%) in Solomon Islands live in rural areas. They are at the frontline, more vulnerable to the impacts and effects of climate and sea level change and less able to cope and adapt. It is therefore, important that they are made aware of the possible impacts and effects of climate and sea level change. Such awareness programmes should involve public talks, video shows and dissemination of information fact sheets on climate change that are of relevance to the Solomon Islands situation.

Environmental education has been introduced into the formal education sector and climate change can be integrated into it. Students at all levels of the formal education sector should learn about their local environment with specific focus on issues relating to the causes, impacts and effects of climate and sea level change. It must be recognized that the school children are an important audience for climate change education as they are the future leaders of tomorrow. Students can also contribute towards awareness raising. This programme involves the development of climate change education materials and the training of teachers about climate change.

Ultimately, the policy and decision-makers are the major players and they should be the prime targets of any awareness programme. These programmes should ensure that the policy and decision-makers are aware of not only the impacts and effects of climate change, but also the opportunities available in implementing the convention and the protocol, including financial assistance and transfer of technology.

6.3 Training and Capacity Building

The previous chapters of this document identified the needs and constraints in implementing the convention and the protocol, and among them are training and capacity building needs.

Like many of the developing countries, Solomon Islands do not have the trained manpower and expertise on climate change. Nor does it have established institutions

and the financial resources to plan and implement appropriate responses to climate change and sea level rise and also to implement the convention and protocol.

The following are some areas that require financial and technical assistance, training and capacity building:

- More information of present baseline conditions in Solomon Islands is required. This would include: identification of sensitive areas and ecosystems; information on land use change and practices; information on natural ecosystems including forests, mangroves and coral reefs; development of fine resolution contour data; and, better understanding of the present effects of social and economic change on the environment.
- More information is needed to understand climate and sea-level sensitivities of the following: subsistence and plantation crops; coastal processes and coral reef systems; ground and surface water resources; malaria; and, marine resources such as the tuna species.
- There is a need for detailed regional and national projections of future changes in climate and sea level and possible changes in cyclone frequency and/or in features of climate variations such as El Nino.
- Further research and information is needed about the effectiveness of proposed adaptation measures in reducing vulnerability.
- There is a need for developing local skills and expertise and the strengthening of institutions which will be involved in ongoing climate change related activities.
- There is need for capacity building under the CDM including the establishment of institutional linkages; project formulation and identification; monitoring, verification, auditing and certification of projects; development of baselines; assessment of costs and risks; and information and data acquisition.
- Development of expertise and skills at higher levels through fellowships and scholarships.
- Identification and assessment of appropriate mitigation and adaptation technologies including information and analysis of constraints to the transfer of technology.

7 CLIMATE CHANGE PROJECT CONCEPTS

In the preparation of this document certain areas were identified that require financial assistance and technology transfer under the conventions enabling activities and mitigation of climate change. The focus of this chapter is to identify possible project concepts for further development and implementation.

Some of the concepts are further illustrated in detail towards the end of this chapter. These are national development projects, which are in line with government policies and strategies, and are relevant to mitigate climate change.

7.1 Promotion and Diffusion of Energy Efficiency and Conservation Technologies

7.1.1 *Lighting* is a major energy consumer in buildings and there is potential for making energy savings and reducing CO2 emissions. This may be achieved by replacing inefficient lamps with high efficiency alternatives. Where efficient lamps have been installed, improvements can still be made by the use of timers and dimmers, and other means of conserving energy.

7.1.2 *Air conditioning* in government offices and business houses is a major source of energy consumption in Solomon Islands. It is possible to reduce the amount of energy consumed in air conditioning by proper maintenance and introducing more efficient air conditioners with controls that allow the system to shut down when the system is not needed.

7.1.3 *Refrigerators* are common source of energy consumption in residential and government buildings. New refrigerator efficiency has been improved dramatically in the major markets and energy savings can be made by the diffusion of this technology into Solomon Islands.

7.2 Training and Capacity Building in Climate Change Research and Country Studies

The capacity of Solomon Islands to make informed and effective decisions and actions on how to respond and adapt to climate change will depend on its capacity to assess and understand the effects and impacts of climate and sea level change at the local and national levels. This can be achieved through research and country studies, on the possible impacts of climate change on the social and economic well being of Solomon Islands. Development of national/regional climate change impact models to examine the effects of climate change (e.g. on agriculture, coasts, health and water resources) would support and enhance research activities as well as provide a tool for technical training, environmental analysis, policy development, and decision-making.

7.3 Institutional Strengthening and Development

The country currently does not have a properly established coordination body to ensure the achievement of the UNFCCC obligations. As such it is important that a climate change office be established to oversee the coordination and implementation of UNFCCC activities and all the in-country climate change programmes. The unit will also ensure that proper data recording and reporting procedures and guidelines are enforced as well as strengthening data acquisition and collection. Climate change related data and information were a handicap as

identified in the preparation of this document. Conceptual procedure needs to be established from which relevant agents and departments could draw on a systematic programme to ensure proper data collection and reporting.

- Establishment of a climate change unit/office for the coordination and implementation of UNFCCC activities and the Solomon Islands Climate Change Programme.
- Enforcement of data recording and reporting procedures and guidelines
- Strengthening data acquisition and collection

7.4 Curriculum Development for Climate Change

The target of this programme is the formal education sector, with the objectives of assessing possible options for curriculum development, production of climate change teaching/instruction materials, training of teachers, and introducing climate change as a subject area in the formal education sector. This programme may be incorporated as part of environment education already taught in schools. The programme will not only create an education and awareness programme, but would also enhance the interest of students to undertake higher level studies on climate change and related issues.

7.5 Promotion of new and renewable energy technologies in mitigating climate change

Promotion and introduction of renewable energy technologies is being expressed under current approved government polices and strategies. The country has the potential resources for new and renewable energy development. Renewable energy technology options for mitigation include: solar energy, hydroelectricity, wind energy and bio-mass. Most of these had been introduced into the country. New technologies include those using fossil fuel with less greenhouse gas emissions.

7.6 Public Awareness and Education

Public awareness and education programmes should be set up to encourage and promote activities to give the general public a better understanding of climate change and its effects and consequently to foster public participation in dealing with climate change related issues. Some target groups include:

- Policy and decision makers
- Sector specific
- Provincial officers
- Rural and village people

7.7 Identification of climate change adaptation technologies suitable to Solomon Islands

As the country becomes susceptible to the effects of climate change or that very little is yet known about the effects and the ability to adapt it is only appropriate that technologies are researched into and appropriate ones identified. It is important to emphasize that adaptation strategies would depend on available options.

7.8 Vulnerability and Adaptation Assessment and Studies

The susceptibility of Solomon Islands to the impacts and effects of changing climate and the rising sea level could never be properly understood of without proper assessments. A detailed assessment would allow a clear understanding of the potential effects which essentially provides the level of vulnerability on

different sectors and where by coping mechanisms could accordingly be drawn from. Identification of technological adaptation options would rely on such assessments.

7.9 Strengthening climate observations, data and information Network

Climate data and information is a basis for understanding climate change and its effects. This programme seeks to establish observation and monitoring mechanisms for climate data and information in all sectors. The initial attempt on vulnerability and adaptation assessment identified a priority need for climate data and information. The present meteorological observing stations are inadequate to provide the necessary data and information for climate change studies in the Solomon Islands.

- Establishment of more climate and meteorological observation stations
- Enhancement of climate data and information data base
- An additional sea level monitoring station

Project Title	**KOMARINDI/LUNGGA HYDRO POWER (KLHP) PROJECT: Renewable Energy Technologies for the Capital City of Solomon Islands, Peri-urban Areas and Industries.**
Rationale	Solomon Islands is dependent primarily on the combustion of fossil fuels for generating electricity. The demand for power in Honiara, the capital of Solomon Islands, has been increasing rapidly and as a result, since 1996 the power plants have not been able to keep up with the demand. The current power generating capacity in the capital is 14.5 MW and current peak load demand has risen to 9.7 MW. Recently an explosion in the power plant reduced the power generating capacity to 10.2 MW, just equal to the peak load capacity. The only mining company in the Solomon Islands is generating its own electricity with a power capacity of 11 MW and a peak load of 8 – 9 MW. Thus the current combined power generation capacity for Honiara should be in the order of 30 MW and hence insufficient. The KLHP project is to construct a 25 MW hydroelectricity power plant, with an average energy output of 170GWh per annum. The KLHP project has the potential to reduce emissions of greenhouse gases from the combustion of fossil fuel for electricity in the capital by more than 90 %, if fully implemented.
Purpose	To provide electricity to Honiara, peri-urban areas and the industrial sector using hydroelectricity technologies, which will result in reduction of greenhouse gas emissions.
Objectives	▪ To construct and install hydro-electricity systems at Komarindi/Lungga locations ▪ To support and strengthen national institutions to sustainably manage the systems as well as provide training in the operation and maintenance of the systems ▪ To measure and monitor greenhouse gas savings generated by this activity ▪ To develop awareness in the urban and peri-urban communities of an understanding of renewable energy technologies, their application and the significance of reducing greenhouse gases
Outputs	▪ Transfer of climate friendly technology and know how ▪ Increase in electricity and water supply to meet the growing demand in Honiara ▪ Increased industrial and other economic activities in Honiara and its periphery due to the improved water and power availability ▪ Savings in foreign exchange at the national level for fuel import ▪ Reductions in greenhouse gas emissions
Implementing Agency	Ministry of Planning, Department of Energy, Environment Division and Solomon Islands Electricity Authority
Needs and Constraints	Renewable energy electrification and the KLHP project are in line with government policies and strategies. Lack of finance has been the obstacle to the implementation of this project.
Resource Requirements	Technology Transfer, Financial and Technical Assistance
Implementation Arrangements	Government is seeking implementation of this project under the financial mechanism of the Climate Change Convention, through the Clean Development Mechanism (CDM), the Global Environment Facility (GEF) and/or other potential funding agencies

Project Title	MINI-HYDRO: Renewable Energy Technologies for Provincial Centre
Rationale	The Solomon Islands is divided into nine (9) provinces. The provincial centres generate electricity using diesel-generators. However, in some of these centres, there is potential to generate electricity wholly from hydropower or interconnected with existing diesel generators. The use of new and renewable energy substitutes will mitigate climate change and benefit the environment, by limiting and reducing emissions of greenhouse gases.
Purpose	To provide electricity to the provincial centres, where feasible, using mini-hydroelectricity technologies, which will result in limitation and reduction of greenhouse gas emissions.
Objectives	▪ To construct and install mini hydro renewable energy systems in identified provincial centres ▪ To support and strengthen national and provincial institutions to sustainably manage the systems as well as provide training in the operation and maintenance of the systems ▪ To measure and monitor greenhouse gas savings generated by this activity ▪ To develop awareness in the provincial centres of an understanding of renewable energy technologies, their application and the significance of reducing greenhouse gases
Outputs	▪ Transfer of climate friendly technology and know how ▪ Increase in electricity and water supply to meet the growing demand. ▪ Increased industrial and other economic activities in the provincial centres due to the improved water and power availability. ▪ Savings in foreign exchange at the national level for fuel import ▪ Reductions in greenhouse gas emissions
Implementing Agency	Ministry of Planning, Department of Energy, Environment Division and Solomon Islands Electricity Authority
Needs and Constraints	Renewable energy electrification for provincial centres is in line with government policies and strategies. Lack of finance has hindered implementation of these strategies.
Resource Requirements	Technology Transfer and Financial and Technical Assistance
Implementation Arrangements	Government is seeking implementation of this project through to the CDM, GEF and/or other potential funding agencies

Project Title	MICRO_HYDRO: Renewable Energy Technologies for Rural Communities
Rationale	The majority of the population (85 %) live in the rural areas without access to electricity supply. Their energy generation is a combination of rainforest timber combustion, kerosene burning, dry cell battery usage, gasoline combustion and small diesel generator operation. The use of renewable energy substitutes will not only mitigate climate change and benefit the environment, but will also improve the standard of rural life and as well provide the opportunity for the rural communities to partake in the sustainable social and economic development of the Solomon Islands. Micro-hydro-electricity has been tested and used in some rural areas of the Solomon Islands.
Purpose	To provide electricity to the semi-urban and rural communities using micro-hydro-electricity technologies, which will result in a reduction of greenhouse gas emissions.
Objectives	▪ To construct and install micro-hydro-electricity energy systems in identified rural community locations ▪ To support and strengthen community institutions to sustainably manage the systems as well as provide training in the operation and maintenance of the systems ▪ To measure and monitor greenhouse gas savings generated by this activity ▪ To develop awareness in the rural communities of an understanding of renewable energy technologies, their application and the significance of reducing greenhouse gases
Outputs	▪ Transfer of environment friendly technology that is suited to the rural communities ▪ Improved health and safety at rural community level through the avoidance of kerosene pollution and serious accidents in domestic dwellings, and the avoidance of diesel pollution around the communal areas ▪ Reduction of water and soil pollution through substitution of diesel drums and waste oil, and through reduction in dry cell disposal ▪ Reduction of rainforest degradation through substitution of electricity for wood burning ▪ An increase in economic self reliance of rural communities through the establishment of micro-enterprises ▪ Savings in foreign exchange at the national level for import of fuel ▪ Reductions in green house gas emissions
Implementing Agency	Ministry of Planning, Department of Energy, Environment Division and Solomon Islands Electricity Authority
Needs and Constraints	Renewable energy electrification for rural communities is in line with government policies and strategies. Lack of finance has hindered implementation of these strategies.
Resource Requirements	Technology Transfer and Financial and Technical Assistance
Implementation Arrangements	Government is seeking implementation of this project through to the CDM. Other possible sources of funding are through the GEF and/or other potential donors

Project Title	SOLAR PV: Renewable Energy Technologies for Rural Communities
Rationale	The majority of the population (85 %) live in the rural areas without access to electricity supply. Their energy generation is a combination of rainforest timber combustion, kerosene burning, dry cell battery usage, gasoline combustion and small diesel generator operation. The use of renewable energy substitutes will not only mitigate climate change and benefit the environment but will also improve the standard of rural life and as well provide the opportunity for the rural communities to partake in the sustainable social and economic development of the Solomon Islands. Solar photo- voltaic technology has been tested and used in a few rural areas of the Solomon Islands.
Purpose	To provide electricity to the rural communities using solar photo-voltaic technology, which will result in a reduction of greenhouse gas emissions.
Objectives	▪ To construct and install solar photo-voltaic energy systems in identified rural community locations ▪ To support and strengthen community institutions to sustainably manage the systems as well as provide training in the operation and maintenance of the systems ▪ To measure and monitor greenhouse gas savings generated by this activity ▪ To develop awareness in the rural communities of an understanding of renewable energy technologies, their application and the significance of reducing greenhouse gases
Outputs	▪ Transfer of environment friendly technology that is suited to the rural communities ▪ Improved health and safety at rural community level through the avoidance of kerosene pollution and serious accidents in domestic dwellings, and the avoidance of diesel pollution around the communal areas ▪ Reduction of water and soil pollution through substitution of diesel drums and waste oil, and through reduction in dry cell disposal ▪ Reduction of rainforest degradation through substitution of electricity for wood burning ▪ An increase in economic self reliance of rural communities through the establishment of micro-enterprises ▪ Savings in foreign exchange at the national level for import of fuel ▪ Reductions in green house gas emissions
Implementing Agency	Ministry of Planning, Department of Energy
Needs and Constraints	Renewable energy electrification for rural communities is in line with government policies and strategies. Lack of finance has hindered implementation of these strategies.
Resource Requirements	Technology Transfer and Financial and Technical Assistance
Implementation Arrangements	Government is seeking implementation of this project through to the CDM. Other possible sources of funding are through the GEF and/or other potential donors

8 NATIONAL COMMUNICATION

8.1 Introduction

The preparation of this initial national communication was in accordance with Article 4.1 and 12.1 of the UNFCCC and the decision 10/CP.2 of the Conference of Parties.

Solomon Islands demonstrated its international obligation to preserve the global climate for the good of the present and future generations by signing and ratifying the United Nations Framework Convention on Climate Change (UNFCCC). The activities of the Pacific Islands Climate Change Assistance Programme (PICCAP) implemented in the Solomon Islands initiated a basis for the preparation of this initial national communication.

The preparation of the Initial National Communication by Solomon Islands helped contribute towards capacity building and identified a whole range of needs, gaps and constraints that had to be addressed in order to implement our commitments under the convention effectively and meaningfully.

The preparation of this Initial National Communication faced obstacles to identify expertise to tackle the various technical aspects as well as the unavailability of data and information.

8.2 Implementation of PICCAP

The ultimate objective of PICCAP is to influence and strengthen the abilities of Pacific Island countries to fulfill their obligations under UNFCCC. Pacific Island Countries, including Solomon Islands, possess neither the trained nor the institutional capabilities to enable them to produce National Communications in accordance with their obligations under the UNFCCC. For Solomon Islands, PICCAP is critical as this represents the only avenue whereby it can make any meaningful attempts to develop appropriate responsive measures and policies in light of its UNFCCC commitments.

PICCAP has six major capacity building objectives that lead to the following outputs:

(1) an inventory of greenhouse gas sources and sinks;
(2) an evaluation of mitigation options;
(3) national vulnerability and adaptation assessment;
(4) an evaluation of adaptation options;
(5) a national implementation plan, and
(6) the first national communication to the conference of the parties to the UNFCCC.

In the Solomon Islands, a country team with broad-based sectoral representation and expertise was established and a coordinator was appointed by the Government to coordinate all activities related to the execution and implementation of the programme at the national level.

Even with the establishment of the Country Team, most members were new to the concepts of climate change and the UNFCCC process and thus hindered their effective participation in decision making and implementing the various activities of the programme. Furthermore, their work commitments interfered with their attendance to meetings and performance of tasks required from them.

The constraints and needs identified in the preparation of this initial national communication are highlighted in the various chapters of this document. In general, the following were found to be cross-cutting issues.

Firstly, there is lack of skilled and trained dedicated expertise on climate change. Experts assigned to climate change activities perform other duties at the national level. This is a serious situation if climate change is to be adequately addressed in Solomon Islands.

One of the major obstacle is that Solomon Islands do not have a climate change policy in place that has a legal framework to undertake the activities in meeting its obligation under the UNFCCC, for instance, the right and authority to access information and data from stakeholders. There is a need for an institutional framework and linkages for proper coordination and implementation of climate change activities.

Moreover, there was lack of data and information mainly due to data and information unavailability, inability of stakeholders to produce them, concerns on public disclosure of data and information, while others totally disregard to supply them. It was also found that stakeholders of data and information do not have proper recording procedures and guidelines. By and large, the private sector rarely takes the opportunities to attend national workshops and seminars on climate change, and thus remain ignorant on climate change issues

CONCLUSIONS

This document is an initial attempt to comply with our UNFCCC obligations, and was funded under the enabling activities of the convention. Despite our negligible contribution to the problem of climate change, Solomon Islands is also concerned with climate change related issues, its future and the future of our common heritage.

The experience and lessons that Solomon Islands has gained in the preparation of this initial National Communication on Climate Change will lead to improvement of subsequent national communications. For example, it became evident during the course of collection of data and information for the preparation of this document, to establish proper data and information recording procedures and regularly updated databases.

The National Communications under the Convention are a useful means of identifying gaps and needs and form the basis for identification of climate change activities and projects and the expected investment so as to realise sustainable development as well as meeting the ultimate objective of the convention.

LIST OF CHEMICAL SYMBOLS AND UNITS

CHEMICAL SYMBOLS

CO_2	Carbon Dioxide
CH_4	Methane
NOx	Nitrogen oxides
CO	Carbon monoxide
H_2O	Water
N_2O	Nitrous oxide
O_3	Ozone
NMVOCs	Non-methane Volatile Organic Compounds
CFCs	Chloroflurocarbons

UNITS

Gg	Gigagrams
km^2	Square kilometres
MW	Megawatts

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