

Independent State of Papua New Guinea
Republic of Vanuatu
Independent State of Samoa
Kingdom of Tonga
Solomon Islands
Republic of Kiribati

**PREPARATORY STUDY ON THE PROGRAM FOR
CLIMATE CHANGE IN THE PACIFIC ISLANDS
(CONSERVATION OF FOREST ECOSYSTEM /
ENVIRONMENTAL MONITORING)**

FINAL REPORT

MAY 2009

JAPAN INTERNATIONAL COOPERATION AGENCY

Nippon Koei Co., Ltd.

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Location Map of Pacific Islands in the Study Area

Summary of the Survey

1. Schedule of the field work

Schedule of the Field Work

Position:	Team Leader/ Environmental Monitoring	AR-CDM expert	Forestry and Ecological Conservation
Name:	Dr. Hiromi Yasu	Mr. Akihiko Sasaki	Mr. Yoji Mizuguchi
Countries:	Solomon Island / Kiribati / Fiji	Papua New Guinea / Vanuatu	Samoa / Tonga
25-Mar Wed		【NRT→Brisbane】	
26-Mar Thu		【Brisbane→Port Moresby】 , Visit JICA office	
27-Mar Fri	【NRT→Brisbane】	Discussion on IcR, data collection	
28-Mar Sat	Arrive Brisbane	Data analysis	【NRT→Auckland】
29-Mar Sun	【Brisbane→Honiara】	Data analysis	
30-Mar Mon	Visit JICA office, discussion on IcR and data collection	Data and information collection	【Auckland→Apia】 , visit JICA office
31-Mar Tue	Data and information collection	Data and information collection	Discussion on IcR and data collection
1-Apr Wed	Field survey/ Data and information collection	Field survey (tentative)	Data and information collection
2-Apr Thu	Field survey/ Data and information collection	Field survey (tentative)	Field survey/ Data and information collection
3-Apr Fri	Field survey/ Data and information collection	Field survey (tentative)	Field survey/ Data and information collection
4-Apr Sat	Data analysis	Data analysis	Data analysis
5-Apr Sun	Data analysis	Data analysis	Data analysis
6-Apr Mon	Field survey/ Data and information collection	Field survey/ Data and information collection	Field survey/ Data and information collection
7-Apr Tue	Field survey/ Data and information collection	Field survey/ Data and information collection	Field survey/ Data and information collection
8-Apr Wed	Discussion on proposed plans	Discussion on proposed plans	Discussion on proposed plans
9-Apr Thu	Discussions on proposed plan, report to JICA office	Discussions on proposed plan, report to JICA office	Discussions on proposed plan, report to JICA office
10-Apr Fri	【Honiara→Brisbane】	【Port Moresby→Brisbane】	【Apia→Auckland】
11-Apr Sat	Team meeting, data analysis	Team meeting, data analysis	Arrive in Auckland
12-Apr Sun	【Brisbane→Nandi】 Move to Suva	【Brisbane→Port Vila】	Data analysis
13-Apr Mon	Data analysis	Data analysis	【Auckland→Nuku Alofa】
14-Apr Tue	Visit JICA office, discussion on IcR and data collection at SPC	Visit JICA office, discussion on IcR	Visit JICA office. Discussion on IcR
15-Apr Wed	Data and information collection	Data and information collection	Data and information collection
16-Apr Thu	【Nadi→Tarawa】	Field survey/ Data and information collection	Field survey/ Data and information collection
17-Apr Fri	Visit JICA office, discussion on IcR and data collection	Field survey/ Data and information collection	Field survey/ Data and information collection
18-Apr Sat	Data analysis	Data analysis	Data analysis
19-Apr Sun	Data analysis	Data analysis	Data analysis
20-Apr Mon	Field survey/ Data and information collection	Discussion on proposed plans	Field survey/ Data and information collection
21-Apr Tue	Discussion on proposed plans	Discussion on proposed plans, report to JICA office	Discussion on proposed plans
22-Apr Wed	Discussion on proposed plans	【Port Vila→Sydney】	Discussion on proposed plans, report to JICA office
23-Apr Thu	【Tarawa→Nandi】	【Sydney→NRT】	【Nuku Alofa→Auckland】
24-Apr Fri	【Nandi→Brisbane】		【Auckland→NRT】
25-Apr Sat	【Brisbane→NRT】		

Other than the three members doing field work, RS/GIS expert, Ms.Baba was assigned in the same period above for one month to collect the updated information on remote sensing technologies in Japan.

2. Issues common to the surveyed countries

Through the field survey in the six countries (PNG, Vanuatu, Samoa, Tonga, Solomon Islands and Kiribati) common issues were found in relation to climate changes as follows.

- (1) Conservation of rare indigenous plant species as a gene pool.
- (2) Institutional/technical development for sustainable forest management
- (3) Participatory/community based watershed and forest management

3. Regional and country wise approach to formulate the program/project

3.1. Policy to formulate the program/project

Except the Papua New Guinea, all of the countries are small island countries where the resources such as man power in the government offices, public organization and institutions, budget and facilities in the government are critically limited in planning and implementing the project activities. If a technical assistance project is formulated in such a country the project input would be excessive compared to the capacity and competency of the counter part organization. In such a case it would be appropriate to take a regional approach by formulating a project covering several small countries which have the same issues to be addressed.

Considering the four key issues listed above, the regional program/projects could be formulated in the areas as follows.

- 1) area to which common technologies can be applied, e.g. forestry planning using the latest satellite images and GIS technologies,
- 2) area in which scientific findings should be shared among the countries, e.g. inventory and study on the rare and useful plants species in the Pacific Islands
- 3) area in which several countries are facing a common serious impacts on the environments, e.g. control of invasive exotic plants in the natural forests
- 4) area in which the common land issues should be addressed, e.g. participatory or community-based forest management

The regional program/project approach could benefit the small islands countries where the resources for development are not sufficient. The regional program/project can provide these countries the opportunities to exchange the technical information, expertise and knowledge between the counties under the program/project. Unlike the small countries, Papua New Guinea is capable to implement the forestry project independently and in most cases she does not need to be supported through the regional approach. Hence it would be considered in each case whether to include PNG or not in the regional projects.

Other than the regional program/project, there are the needs to formulate the country wise projects, such as promotion of forestry research and higher education (PNG), conservation of watershed or special forests (Tonga), rehabilitation of national herbarium (Solomon Islands) and preparation of audio-visual materials for extension activity (Kiribati). The country wise project should be formulated compatible with the capacity of the forestry department and relevant government offices in the country.

3.2. Advantages to formulate the regional program/project

The regional program/project has two different areas in its implementing structure which are small scale projects planned in each target country and the management and workshops and seminar programs at the base of the project. The project base should be located in the international organizations covering the pacific islands countries such as SPC (Secretariat of Pacific Community) in Fiji and SPREP (South Pacific Regional Environmental Program) in Samoa which have enough experiences to manage the regional program and project. The areas covered by these organizations and the proposed regional project are summarized in the next table.

Areas covered by SPC and SPREP and proposed regional program/project

	SPC	SPREP
Area covered by SPC and SPREP	Agricultural and Forestry Development, Education and extension to the community, Resource assessment using satellite image,	Environmental monitoring for hazard control and conserving the biodiversity, Control of alien invasive wild plants,
Proposed regional program	Inventory and utilization of rare and useful local plants, Forest resource assessment & monitoring using satellite images, Participatory and community-based forest management,	Inventory and utilization of rare and useful local plants, Control of alien invasive wild plants,

Source: JICA Study Team, April 2009

The inputs to each small country in the regional project will be compatible to the capacity of the country, which makes possible to implement small scale activities. Meanwhile there are several advantages for the Japanese side to implement the regional program/project as listed below.

- (1) To plan the activities in appropriate scale in each country,
- (2) To support several countries at the same time,
- (3) To utilize the experiences, human and information networks of the international organizations which have worked for years in the Pacific Islands countries
- (4) To arrange the formulate the sustainable environment in the international organization by sharing the experiences and outputs of the project activities with the staff and experts

3.3. Issues to be addressed

There are some issues to be addressed when implementing the regional program/project as the followings.

- (1) Funding mechanism needs to be secured to make sure the long term support to the countries under the program/project
- (2) Well-experienced advisor who is competent to formulate and manage the regional program/project is needed to be assigned with the start of the project.
- (3) Application of the experiences from the past/ongoing JICA technical cooperation project on national park management and forest tree breeding

3.4 Regional and country wise project

Following tables show the list of proposed project of regional level and country wise. “Step by Step” approach is practical and recommendable to implement those project listed in the table. The proposed projects and their scheme listed in the table are regarded as the original ideas which need to be investigated over during the process of program formation at JICA head quarter in Tokyo. Hence they do not restrict at all to formulate other types of program/projects hereafter.

List of Proposed Projects implemented in the pacific islands region

Area	Name of the Project	Scheme	Country
Sustainable forest management	Forest Inventory survey using satellite images and updating forestry data base (Mitigation/adaptation,)	Technical cooperation on regional type, Dispatch of JOCV work for GIS and mapping (Base:SPC)	Samoa, Tonga, Solomon Islands,
Survey on rare/useful local plants	Inventory survey of rare/useful plants and study on the utilization and extension (Adaptation)	Technical cooperation on regional type, Dispatch of JOCV work for GIS and mapping (Base:SPC)	Solomon Islands, Papua New Guinea
Control of invasive harmful plants	Controlling invasive plants in the protected area (adaptation)	Technical cooperation on a regional type (Base: PRREP)	Samoa, Kiribati

Source: JICA Study Team, April 2009

The target countries show the tentative results. The exact target countries for the regional project will be selected in the survey for the project formulation in the future..

The country wise projects are listed below. The Projects proposed in PNG and Vanuatu will be implemented in their country.

Country wise Proposed Project

Country	Project	Scheme	Implementation
PNG	1-1) Forest inventory using satellite data (Mitigation)	Technical cooperation: 3 years, Loan and TA (grant):7 years	Country wise
	1-2) Development Study on Participatory Forest Management	3 years for formulation of reforestation master plan and	Country wise

Country	Project	Scheme	Implementation
	Project (including AR-CDM) (Mitigation)	pilot project 2 years for implementation of the pilot project	
	1-3) Activation of forestry research and education (Adaptation)	Technical cooperation: 10 years	Country wise
	1-4) Survey and research on biodiversity (Adaptation)	Technical cooperation: 5 years + a	Country wise
	1-5) participatory management of mangrove forest (Adaptation)	Technical cooperation: 5 years, or Development study: 3 years	Country wise
Vanuatu	2-1) Forest inventory and formulation of forestry planning	Development study: 2 years	Country wise
	2-2) Biodiversity conservation through environmental education	Technical cooperation: not less than 10 years,	Country wise
	2-3) Preparation of National Communication (UNFCCC)	Dispatch of expert: 1 year	Country wise
Samoa	3-1) Promotion of community-based forest management (Adaptation)	Technical cooperation: 5 years	Country wise
	3-2) Community based watershed management in the critical watershed (Mitigation/adaptation)	T/A or Development study of 10 years, Development study including pilot project	Country wise
	3-5) Community-based biodiversity conservation (adaptation)	Technical cooperation: 5 years	Country wise
Tonga			
	4-2) Sustainable forest management of the remaining forest (adaptation/mitigation)	Development study including pilot survey	Country wise
	4-3) Formulation and implementation of watershed management (adaptation/mitigation)	Dispatch of JOCV/JOSV to the forestry department	Country wise
	4-4) Restoration and rehabilitation of mangrove and littoral forest (Adaptation)	Combination of technical cooperation & dispatch of JOCV	Country wise
	4-5) Assistance in planting trees in TAX allotments (Adaptation/Mitigation)	Dispatch of JOCV to the Forestry Department	Country wise
Solomon islands	5-2) Rehabilitation of national herbarium and botanical garden in Honiara (Adaptation)	Cultural grant aid: 2 years Dispatch of JOCV: 2 years	Country wise
Kiribati	6-1) Audio-visual education on the biodiversity conservation (Adaptation)	Dispatch of JOCV: 2 years	Country wise
	6-2) IT systems and data base of MELAD (Adaptation)	Dispatch of JOCV: 2 years	Country wise

Source: JICA Study Team, April 2009

Preparatory Study on the Program for Climate Change in the Pacific Island

(Conservation of Forest Ecosystem / Environmental Monitoring)

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- 3.1. Schedule of the Study
- 3.2. Brief Features of Proposed Projects

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- 4.2. Brief Features of Proposed Projects

【Annex-5: Tonga】

- 5.1. Schedule of the Study

5.2. Brief Features of Proposed Projects

【Annex-6: Solomon Islands】

6.1. Schedule of the Study

6.2. Brief Features of Proposed Projects

【Annex-7: Kiribati】

7.1. Schedule of the Study

7.2. Brief Features of Proposed Projects

Abbreviation

General	
AR-CDM	Afforestation/Reforestation Clean Development Mechanism
AusAID	Australian Government Overseas Aid Program
CBD	Convention on Biological Diversity
CDM	Clean Development Mechanism
CITES	Convention on International Trade in Endangered Species of Wild Flora and Fauna
DNA	Designated National Authority
EU	Europe Union
FAO	Food and Agriculture Organization
GCCCA	(EU) Global Climate Change Alliance
GEF	Global Environmental Facility
GHG	Green House Gas
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
IUCN	International Union for Conservation of Nature
NAPA	National Adaptation Programmes of Actions
NGO	Non-Government Organization
REDD	Reducing Emissions from Deforestation and forest Degradation in developing countries
SBSTA	Subsidiary Body for Scientific and Technological Advice (under UNFCCC)
SOPAC	Pacific Islands Applied Geoscience Commission
SPC	Secretariat of the Pacific Community
SPREP	South Pacific Regional Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Program
WWF	World Wildlife Fund
Papua New Guinea	
DEC	Department of Environment and Conservation
FMA	Forest Management Agreement
FRI	Forest Research Institute
LFA	Local Forest Area
NRI	National Research Institute
NFA	National Forest Authority
NFS	National Forest Services
NFB	National Forest Board
OCCES	Office of Climate Change and Environmental Sustainability
PINBio	PNG Institute of Biodiversity
PNG	Papua New Guinea
TRP	Timber Rights Purchase
UNITEC	University of Technology
Vanuatu	
NACCC	National Advisory Committee for Climate Change
VCCP	Vanuatu Carbon Credits Project
Samoa	
AR-CDM	Afforestation/Reforestation Clean Development Mechanism
AusAID	Australian Government Overseas Aid Program

CBD	Convention on Biological Diversity
CDM	Clean Development Mechanism
CI	Conservation International
EU	Europe Union
FAO	Food and Agriculture Organization
FD	Forestry Department
GEF	Global Environmental Facility
GOS	Government of Samoa
JICA	Japan International Cooperation Agency
MNRE	Ministry of Natural Resources and Environment
MPAs	Marine Protected Areas
NAPA	National Adaptation Program of Action
NP	National Park
PACC	Pacific Adaptation to Climate Change
REDD	Reducing Emissions from Deforestation and forest Degradation in developing countries
SPC	Secretariat of the Pacific Community
SPREP	South Pacific Regional Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNDP	United Nations Development Program
Tonga	
AusAID	Australian Government Overseas Aid Program
CBD	Convention on Biological Diversity
DENR	Department of Environment and Natural Resources
EU	Europe Union
FAO	Food and Agriculture Organization
GEF	Global Environmental Facility
GHG	Green House Gas
JICA	Japan International Cooperation Agency
JOCV	Japan Overseas Cooperation Volunteer
MAFFF	Ministry of Agriculture and Food, Forest and Fisheries
MLSNRE	Ministry of Land, Survey, Natural Resources and Environment
MOA	Memorandum of Agreement
NBSAP	National Biodiversity Strategy and Action Plan
NZAID	New Zealand Government Overseas Aid Program
NP	National Park
SDP	Strategic Development Plan
SLM	Sustainable Land Management
SPC	Secretariat of the Pacific Community
SPREP	South Pacific Regional Environmental Programme
SV	Senior Volunteer
TTL	Tonga Timber Ltd.
TWB	Tonga Water Board
UNFCCC	United Nations Framework Convention on Climate Change
UNDP	United Nations Development Program
Solomon Islands	
FRTU	The Forest Resources and Timber Utilization Act
MTDS	Medium Term Development Strategy
SIFMP	Solomon Islands Forest Management Project (By AUS Aid)
Kiribati	

ADD	Agricultural Development division
ECD	Environmental Conservation Division
KAP	Kiribati Adaptation Project
LMD	Land Management Division
MELAD	Ministry of environment, land management and agricultural development
MOP	Ministry Operational Plan

1. INTRODUCTION

1.1 Backgrounds

The IPCC Fourth Assessment Report prepared by the Working Group I and released in February 2007 clearly indicates that the increase of greenhouse gases in the atmosphere has attributed to the global warming and the climate changes. The increasing disasters caused by sea level rise, drought, typhoon/hurricane, and flood have threatened the small and low altitude countries in the Pacific Islands. There is an emergent need for those countries to prepare and implement strategic measures to mitigate or adopt to those disasters. Among the measures, the conservation and rehabilitation of forest ecosystems is regarded as one of the prioritized activities to be conducted because (a) it could work simultaneously as mitigation as well as adaptation measures against the climate changes, (b) it could mitigate the physical damages caused by natural disasters such as storm, landslides and flood, and (c) it could contribute to improvement of the livelihood of the local community.

At the annual conference of World Economic Forum held in January 2008 in Switzerland (Davos meeting), the former Japanese Prime Minister, Mr. Yasuo FUKUDA, announced a new financial mechanism to assist developing countries to address climate changes called “Cool Earth Partnership” on a scale of US\$ 10 billion. In July 2008, the Japanese Government provided “climate change-related program loan” to Indonesia as the first loan aid under the Partnership. Japanese Government has also decided to provide the fund to the Pacific Islands countries which are mostly quite vulnerable to the climate changes. As the target countries supported by the Partnership, the Government selected twelve (12) countries which got through the policy dialogue successfully, such as Palau, Micronesia, Marshall, Nauru, Kiribati, Papua New Guinea, Vanuatu, Tuvalu, Samoa, Tonga, Niue and Cook Islands.

In accordance with the policies of Japanese Government, JICA intends to strengthen the assistance related to the issues of climate changes to the Pacific Islands countries.

1.2 Objectives

The objective of the Study is to grasp the needs of six countries (Papua New Guinea, Solomon Island, Vanuatu, Kiribati, Samoa and Tonga) on mitigation and adaptation measures related to forest ecosystem conservation and environmental monitoring through field studies and to identify/ propose mitigation/adaptation measures for further consideration to formulate the program/projects targeting this region.

1.3 Schedule of the Field Work

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20-Apr Mon	Field survey/ Data and information collection	Discussion on proposed plans	Field survey/ Data and information collection
21-Apr Tue	Discussion on proposed plans	Discussion on proposed plans, report to JICA office	Discussion on proposed plans
22-Apr Wed	Discussion on proposed plans	【Port Vila→Sydney】	Discussion on proposed plans, report to JICA office
23-Apr Thu	【Tarawa→Nandi】	【Sydney→NRT】	【Nuku Alofa→Auckland】
24-Apr Fri	【Nandi→Brisbane】		【Auckland→NRT】
25-Apr Sat	【Brisbane→NRT】		

Other than the three members doing field work, RS/GIS expert, Ms.Baba was assigned in the same period above for one month to collect the updated information on remote sensing technologies in Japan.

2. Key Ideas to Formulate the Program/Project in Conservation of Forest Ecosystem/Environmental Monitoring

2.1 Issues of importance common in the surveyed countries

Through the field survey in the six countries such as PNG, Vanuatu, Samoa, Tonga, Solomon Islands and Kiribati) common issues were identified in those countries in relation to address against the reverses by the climate changes. Those are;

(1) Conservation of rare indigenous plant species as a gene pool.

The Pacific island countries are surrounded by the ocean being relatively isolated from the evolution process. Except Papua New Guinea the islands countries are not so rich in the number of fauna and flora species. But these countries are rich in rare plant species found only in this region. The ratio of rare species among the total plants in this region is relatively high compared to those in other regions of the tropics. Therefore conservation of these species are important in maintaining biodiversity in this region. Technical cooperation is needed in collecting and identifying the rare plant species as well as studying their utilization.

(2) Institutional/technical development for sustainable forest management

The forestry sector needs the latest information on forest and forest land in the country updated by the analysis of the recent satellite images and field survey. The updated and correct information of forests are the basis of sustainable forest planning and management. The detailed needs in analyzing/utilizing the satellite images differs in each countries, which requires to design the project type cooperation based on their needs of those countries.

(3) Participatory/community-based forest management

To secure the participation or initiative of the local community is a prerequisite of forestry projects in these countries. The forest and woodlands in the country are owned by the community except some parts of protected area and national parks established by the government. Participatory / Community-based planning and implementation is a main approach to promote to establish the plantation and rehabilitate the degraded forests after the logging.

2.2 Regional and country wise approach to formulate the program/project

2.2.1 Policy to formulate the program/project

Except the Papua New Guinea, all of the countries are composed of small islands where the resources such as man power in the government offices, public organization and institutions, budget and facilities in the government are critically limited in planning and implementing the project activities. If a technical assistance project is formulated in such a country the project input would be excessive in some cases compared to the capacity and competency of the counter part organization in their

government. In such a case, it would be appropriate to take a regional approach by formulating a project covering several small countries which have the same issues to be addressed.

Considering the three key issues listed in the section 2.1, the regional program/project could be formulated as four key areas. Those are;

Four key areas appropriate to formulate the regional program/project:

- 1) Survey and development of useful/rare local plants (correspond to the item 2.1 (1))
- 2) Control of invasive plants (correspond to the item 2.1 (1))
- 3) Sustainable forest management plan using RS/GIS technologies (correspond to the item 2.1 (2)),
- 4) Participatory/community-based forest management (correspond to the item 2.1 (3))

The four key areas above correspond to the issues of importance raised in the section 2.1. They could become the core in formulating the regional program/project in the conservation of forest ecosystem / environmental monitoring.

The regional program/project approach could benefit the small islands countries where any types of resources for the development are critically limited. The regional program/project can give these countries the opportunities to exchange the technical information, expertise and knowledge among the counties under the program/project.

Unlike the small countries, Papua New Guinea is likely capable to implement the forestry project independently. Hence it would be considered in each case whether the regional program/project include PNG or not in the implementing structure.

Other than the regional program/project, there are also the needs to formulate the country wise projects according to the specific needs of each country. They are promotion of forestry research and higher education (PNG), conservation of watershed or special forests (Tonga), rehabilitation of national herbarium (Solomon Islands) and preparation of audio-visual materials for extension activity (Kiribati). The country wise project should be formulated compatible with the capacity of the forestry department and other relevant organizations of the government in those countries.

2.2.2 Advantages to formulate the regional program/project

The inputs to each target country by the regional program/project have to be compatible to the capacity of the country so that the government can manage to implement with its limited resources. Meanwhile there are several advantages for the Japanese side to implement the regional program/project as below.

- (1) Appropriate scale of the program/project activities in each country,

- (2) Support to several countries at the same time,
- (3) Making full use of utilizing the experiences, human and information networks of the regional organizations in the pacific islands countries
- (4) Arrangement of the sustainable environment by involving the regional organizations as the center or cooperating organizations to the program/project

The regional program/project has less input to each target county compared to the country wise project. However it could develop more sustainable environment to continue the activities by being based at the regional organizations which can support the activities continuously even after the completion of the program/project, which is appropriate for the small islands countries where the resources for the development activities are critically limited and it is difficult to attain the program/project goals in a shorter period.

The Japanese ODA has its experiences in formulating and implementing the regional project such as "Bornean Biodiversity and Conservation Project (Phase II)" and "Pacific Islands Solid Mast management Project", which gives several lessons learnt to formulate/implement new regional program/project in conservation of forest ecosystem/environmental monitoring.

2.3 Ongoing regional program/project in conservation of forest ecosystem/environmental monitoring

2.3.1 Regional organization

The regional program/project has two different areas in its implementing structure which includes the small scale projects planned country wise and the activities such as seminars and workshops conducted at the central level in the regional organization. The center of the program/project is based at the regional organizations covering the pacific islands countries. SPC (Secretariat of Pacific Community), SOPAC (South Pacific Applied Geo-science Commission) and USP (University of the South Pacific) all of which are based in Fiji, and SPREP (South Pacific Regional Environmental Program) in Samoa are supposed to be the center of the regional program/project in conservation of forest ecosystem/environmental monitoring. Their policies and important areas which they focus upon and their relations to the "four key areas" raised in 2.2.1 are indicated in the next table.

The Policies of the regional organizations and their relations to the four key areas

SPC/LRD: Secretariat for the Pacific Community/Land Resource Division	
Policy and program	<p>The Land Resource Division of SPC formulated "Land Resource division Strategic Plan 2009 – 2012" which included three broad programs and their outputs as follows.</p> <p>1. Improvement of food and nutritional security:</p> <p>1-1. Development of policies to support the production, utilization and consumption of local grown food sources</p> <p>1-2. Agro-biodiversity conserved, developed, protected and utilized</p> <p>1-3. Diverse food supply systems promoted</p> <p>1-4. Traditional knowledge preserved, enhanced and acknowledged</p> <p>2. Integrated and sustainable agricultural and forestry management and development:</p>

	<p>2-1. Development of sustainable forestry, agriculture and land-use plans, policies, and legislation supported</p> <p>2-2. Sustainable and appropriate forest, agriculture and land use management practices developed and promoted</p> <p>2-3. National and regional capacity to prepare, respond, and adapt to climate change and natural disasters developed and strengthened</p> <p>2-4. Invasive species, pests, and disease problems identified and addressed, and capacity to responds at national and regional levels supported</p> <p>2-5. National and regional capacity of extension, outreach and information services strengthened</p> <p><u>3. Improved bio-security and increased trade in agriculture and forestry products:</u></p> <p>3-1. National capacity to comply with international and other relevant standards strengthened</p> <p>3-2. National capacity to increase domestic and export trade developed and strengthened</p> <p>3-3. Sustainable and viable post-harvest technologies developed and promoted</p> <p>3-4. Improved information available on plant and animal health status</p>
Relations to the four key areas	<p>1-2. Agro-biodiversity conserved, developed, protected and utilized → 2) Survey and development of useful/rare local plants</p> <p>2-1. Development of sustainable forestry, agriculture and land-use plans, policies, and legislation supported → 1) Sustainable forest management plan using RS/GIS technologies, 4) Participatory/community-based forest management</p> <p>2-4. Invasive species, pests, and disease problems identified and addressed, and capacity to responds at national and regional levels supported → 3) Control of invasive plants</p>
SPREP: South Pacific Regional Environment Program	
Policy and program	<p>SPREP has two broad programs as follows to implement the projects.</p> <p><u>1. “Island ecosystem”</u></p> <p>1-1. Terrestrial ecosystems management</p> <p>1-2. Coastal and marine ecosystems</p> <p>1-3. Species of special interest</p> <p>1-4. People and institutions</p> <p><u>2. “Pacific futures”</u></p> <p>2-1. Managing multilateral environmental agreements and regional coordination mechanisms</p> <p>2-2. Environmental monitoring and reporting</p> <p>2-3. Climate change and atmosphere</p> <p>2-4. Waste management and pollution control</p> <p>2-5. Environmental planning</p>
Relations to the four key areas	<p>1-1. Terrestrial ecosystems environment → 3) Control of invasive plants</p> <p>1-3. Species of special interest → 2) Survey and development of useful/rare local plants</p>
SOPAC: South Pacific Applied Geo-science Commission	
Policy and program	<p>SOPAC has three broad programs as follows to implement the projects. These three key program areas are supported by Corporate Services. To effectively provide these support services, SOPAC maintains an information technology unit, provides publication and library services, and offers technical and field services for specific project work.</p> <p><u>1. “Ocean and Islands”</u></p> <p>“Ocean and Islands” is an integrated program focused on research, development and management of non-living resources in ocean and island systems addressing issues relating to seabed resources, energy, maritime boundary delimitation and monitoring of ocean processes.</p> <p><u>2. “Community lifeline”</u></p> <p>Community lifeline is a diversified program that strengthens national capacities in energy, water and sanitation, information and communications technologies.</p> <p><u>3. “Community risks”</u></p> <p>Community risk is a comprehensive program aimed at reduction of community</p>

	vulnerability through improved hazard assessment and risk management.
Relations to the four key areas	The programs of SOPAC do not focus on forest ecosystem. However the Information technology and RS/GIS unit provides technical services in interpreting the satellite images and collecting data in ground truth. It conducted the study in collaboration with SPC to investigate and estimate the resources in Fiji and Kiribati. → 1) Sustainable forest management plan using RS/GIS technologies, 4) Participatory/community-based forest management
USP: University of the South Pacific	
Policy and program/Activities	The Institute of Applied Sciences in Faculty of Science, Technology and Environment is doing the research on forest ecosystem and environmental monitoring in the pacific islands countries. Their main activities are: <u>1. Set up of the monitoring station of micro-climate in the natural forest :</u> The herbarium unit of IAS has set up the monitoring station of micro-climate in the natural forests in Fiji islands collaborating with Chicago University, Hawaii University and Kyoto University. It aims to investigate the interrelations between the fluctuations of micro-climate in the natural forests and the changes of composition of vegetation in the forests. <u>2. Making of the maps of forest vegetation and operation plan by using GIS technologies:</u> The GIS Unit of IAS instructed the staff of forestry department in Fiji to prepare the maps of forest vegetation and operation plan using GIS. <u>3. Survey of forest resources:</u> The herbarium unit of IAS conducted the field survey collaborating with SPC on the forest resources titled "South Pacific Regional Initiative on Forest Genetics Resources" (SPRIG). It developed the data base of indigenous tree species distributing in the pacific islands countries.
Relations to the four key areas	<u>2. Making of the maps of forest vegetation and operation plan by using GIS technologies</u> → 1) Sustainable forest management plan using RS/GIS technologies, 4) Participatory/community-based forest management, <u>3. Survey of forest resources</u> → 2) Survey and development of useful/rare local plants, 3) Control of invasive plants

Source: The JICA Study Team, April 2009

2.3.2 Ongoing regional program/project

Followings are the cases of ongoing regional program/project which are based in the regional organizations in Suva in Fiji.

(1) Survey on the natural/agricultural vegetation using RS/GIS technologies: A case of collaboration between SPC and SOPAC

SOPAC and SPC collaborate in analyzing satellite images and utilizing them in assessing the forest and agricultural resources in the pacific islands countries. As one of their activities, SOPAC interpreted the pan-sharpened Quick Bird images to identify the distribution of coconuts trees for food and wood in Rutoma island in Fiji and estimate the existing resources and future demand to develop the coconuts plantation by analyzing the demographic and economic data provided by SPC and the forestry department in Fiji. The outputs of this study were utilized in planning the extension program of coconuts palms in the surveyed areas by SPC. In Kiribati SPC has supported the RS/GIS expert of SOPAC to provide the fund to conduct the field survey to identify the coconut palms and pandanas trees in the atoll islands. With the results of the survey he intends to analyze the satellite images to assess the food and wood resources distributing in the atoll islands of Kiribati. Then SPC

will utilize the outputs of the survey and formulate the extension program and plans to provide the seeds and seedlings of the food/wood crops to the people aiming to increase their production in the country.

SOPAC does not target on the monitoring of forest ecosystem and its relevant environments, rather it focuses on monitoring coastal and marine environment which are more exposed to the reverses of climate changes. However as described above, there are cooperation and collaboration between the experts of SOPAC and SPC in implementing small scale survey and research activities, which make it possible both two organizations could be benefited to implement their own programs. The information said SOPAC would be divided into several sections to merge with SPC and SPREP in 2009, which have been for years discussed among the member countries. When implemented, the sections merged with SPC are to monitor the land use and forest resources by using the satellite images as one of their official tasks, while those merged with SPREP will be responsible to monitor the environmental degradation in the marine and coastal areas through interpreting the images.

As one of the topics of the Study, the JICA Study Team collected information regarding the program/project formation in the area of RS/GIS, which proposed the issues and topics in the RS/GIS cooperation in the pacific countries. For the detailed information, please refer the final report of Japanese version.

(2) Forest Resource assessment

SPC and USP (The University of the South Pacific) collaborated in carrying out the “South Pacific Regional Initiative on Forest genetic Resources (SPRIG)” to identify the local/rare plant species distributed in the pacific countries and developed the comprehensive data base. It is currently kept in SPC and USP to be utilized in relevant study and research programs. The SPRIG data base is the best equipped data sources on the local plants among all existing information resources in this region. Therefore in case the program/project is formulated in the areas associated with the plant genetics, it should fully utilize the SPRIG data base to materialize its activities.

(3) Regional program addressing the issues of forest conservation and climate changes by GTZ

GTZ in cooperation with SPC has launched in 2009 the programs titled “Adaptation on climate change in the Pacific Island Region” targeting the Fiji islands, Vanuatu and Tonga. This is succeeding program following the forestry sector project by GTZ carried out from 1994 until 2008. The program aims to support the target countries in developing the institutional set ups to sell the carbon credits generated through conserving the natural forests to the international market. A well experienced chief advisor based in the compound of South Pacific Forum is in charge of coordinating between/among the targeting countries and SPC in implementing the activities.

2.3.3 Issues to be considered in implementing the regional program/project

While the regional program/projects attained several significant achievements, they also provide us lessons learnt which need to be reviewed in formulating the future program/project. Those are summarized into three points as follows.

Issues need to be considered in formulating the future regional program/project :

(1) Framework of the program/project to ensure long-term assistance

The regional program/project should be designed to have a longer period of implementation. Those proposed in the following sections are supposed to be implemented for two phases of technical cooperation, which continues in total six to ten years as a whole period. Besides, the implementation structure should include the regional organizations as a central partner so that it can integrate the program/project activities into their own policies and provide continuous technical and financial assistance even after the program/project completion.

(2) Experienced advisor competent to formulate and implement the regional program/project

Unlike the cases of country wise projects, the regional program/project have to be formulated consisting with the policies and project activities implemented by the regional organizations and the target countries. Its framework for implementation is more complicated than those of single projects and the coordination among/between the target countries and the regional organization becomes a key to success the regional program/project. Therefore, an experienced expert who has a career working in an international/regional organization is required to take a position of program/project chief advisor in planning and implementing the activities. Adding to the advisor, a JICA expert or JOCV (Japan Overseas Cooperation Volunteer) or JOSV (Japan Overseas Senior Volunteer) would be needed in some cases to assist the target countries carrying out the program/project activities.

(3) Application of the experiences from the past/ongoing JICA technical cooperation projects in the pacific countries

The future regional program/project have to be formulated being applied the lessons learnt from the past and ongoing JICA project such as 1) the capacity development in the national park management and some technical findings on surveying the rare local plant species and controlling the invasive plants in Samoa, and 2) the assistance to the target country governments in formulating the master plan of country wide solid waste management.

2.4 Regional and country wise program/project

Based on the review of the analysis in the former sections, the future regional and country wise program/project are proposed in the field of conservation of forest ecosystem/environmental monitoring.

2.4.1 Regional program

Three regional programs are proposed in the next table. As shown in the table, they are supposed to be implemented according to their priorities. The programs proposed in the table are only draft ideas of the Study Team, which does not limit the possibility to formulate other programs or to determine the direction of materializing the regional program.

Proposal of regional program

Area	Program (type)	Emergency	Target country	priority¹⁾
Sustainable forest management plan using RS/GIS technologies	Forest inventory survey and preparation of forest vegetation/operation map using RS/GIS technologies (mitigation/adaptation)	High	Samoa, Tonga, Solomon islands, Kiribati, PNG, Vanuatu ²⁾	1
Control of invasive Plants	Management of protected area through controlling invasive plants (adaptation)	High	Vanuatu, Samoa, Solomon islands,	2
Survey and development of useful/rare local plants	Inventory survey, utilization and extension of useful/rare local plants (adaptation)	Medium	PNG, Solomon islands, Samoa	3
Participatory/community-based forest management	Institutional development for sustainable management of communal forests through participatory / community-based approach (adaptation)	Medium	Samoa, PNG ²⁾	4

Source: JICA Study Team. April 2009. 1) Prioritized based on emergency and number of target countries
 2) Country wise projects to be formulated in PNG and Vanuatu

The target countries indicated in the table are tentatively proposed based on the results of the Study Team's survey, which needs to be further examined and decided through the detailed study to formulate the regional program. As the table shows, the "Sustainable forest management plan using RS/GIS technologies" are ranked as the highest priority because it provides the updated basic data and information needed in forest planning and utilization in a sustainable manner. The centers of the programs are supposed to be SPC and SPREP, while SOPAC and USP function as cooperative organizations. The consistency of the program activities with the existing policies of those entities and the implementing formations of the program taking into account the lessons learnt as listed in the section 2.3.3. are summarized in the next table.

Consistency of the proposed program with the policy of the regional organizations and its implementing formation considering the lessons learnt

<p>Program No.1: Forest inventory survey and preparation of forest vegetation/operation map using RS/GIS technologies (mitigation/adaptation)</p>
<p><u>1. Consistency of the program with the policy of the regional organization:</u> The regional organization of SPC is a center of this program. SOPAC cooperate in analyzing and interpreting the satellite images. It supports the activities by the forestry department in the target countries.</p> <p>1-1. Activities of the regional organization</p> <ul style="list-style-type: none"> - Analysis and interpretation of satellite image combined with ground truth by SOPAC - Workshops carried out by SPC and SOPAC on how to utilize the images, the preparation of forest vegetation/operation map using GIS technologies, and formulation of forest management plan in a sustainable manner <p>1-2. Activities in the target countries</p> <ul style="list-style-type: none"> - Assistance in preparing the forest vegetation/operation maps using satellite images and GIS technologies - Assistance in formulating forest management plan, implementing and monitoring the operation. - Assistance in developing institutional arrangement for the participatory/community-based forest management <p>1-3. Consistence with the policies/activities of the regional organizations</p> <p>SOPAC has information and RS/GIS unit to cooperate with other organization on a long/short term project basis. Although it does not have project experiences, SPC has a program to support the countries to develop the institutions of sustainable forest management which are requested by the governments of targeted countries.</p>
<p><u>2. Implementing formation considering the lesson learnt:</u></p> <p>2-1. Long-term program period</p> <p>The program is carried out in a form of technical cooperation. It is designed to have two phases (10 years as an implementing period (one phase is supposed to be five years). As one of the outputs the forestry departments of the target countries prepare the comprehensive data base of forest and forestry so that other donors and NGOs can utilize it to continue supporting sustainable forest management.</p> <p>2-2. Program advisor and expert</p> <p>One chief advisor needs to be assigned in a center of the program(SPC) while a JICA expert or JOCV/JOSV in the areas of forest management or participatory/community-based forest management could be dispatched to the target counties to assist their activities according to the technical and management levels of the country.</p> <p>2-3. Application of the experiences in the past/ongoing JICA projects</p> <p>The experiences to assist the countries in formulating the master plan of country wide solid waste management could be applicable to the support for formulating the sustainable forest management plan. The technical know-how obtained in the RS/GIS project currently conducted in the ministry of forestry in Indonesia could be useful in the analysis and interpretation of satellite images.</p>
<p>Program No.2: Management of protected area through controlling invasive plants (adaptation)</p>
<p><u>1. Consistency of the program with the policy of the regional organization:</u> Although the SPC has their own program regarding the control of invasive plant species, SPREP functions as a center of the program because it has an experiences of the project activities on invasive species. SPC plays a role as a supporting organization in planning and implementing extension activities.</p> <p>1-1. Activities of the regional organization</p> <ul style="list-style-type: none"> - Development of data base on the distribution of invasive plants in the pacific countries by SPREP - Experiments to develop the technologies applicable to the countries in controlling the invasive plants by SPREP - Workshops to disseminate the developed technologies to the countries and its monitoring by SPREP - Support by SPC to the countries who plan and implement the extension of technologies to control the invasive plants <p>1-2. Activities in the target countries</p> <ul style="list-style-type: none"> - Experiment and extension of the technologies specific to each country to control the invasive plants <p>1-3. Consistence with the policies/activities of the regional organizations</p> <p>SPREP has a program and implements the project to control the invasive species. SPC also has the same program.</p>
<p><u>2. Implementing formation considering the lesson learnt:</u></p> <p>2-1. Long-term program period</p>

The program period are divided into two phases, which consists of the first phase focusing the experiments and developing the technologies and the second phase implementing extension and monitoring of the technologies. One phase continues three years. The project formation intends to ensure the long term assistance by integrating two regional organizations which have the consistent program with the proposed one. The experiences of SPREP can provide practical view to formulate the program.

2-2. Program advisor and expert

A well experienced program advisor need to be assigned in formulating and implementing this program. He/she is responsible to coordinate between/among the target countries, SPC and SPREP in holding the workshop, monitoring the extensions of controlling technologies in each country, etc. When it is needed, JICA expert or JOCV/JOSV are assigned to support the countries in developing technologies and implementing the extension activities.

2-3. Application of the experiences in the past/ongoing JICA projects

The experiences from the JICA project of capacity development of national park management in Samoa and those of SPREP could be applied to the program.

Program No.3: Inventory survey, utilization and extension of useful/rare local plants (adaptation)

1. Consistency of the program with the policy of the regional organization:

SPC and SPREP function as a center of the program.

1-1. Activities of the regional organization

- Review of the data base on useful/rare local plants by SPREP, including the data base developed by SPRIG
- Workshop on inventory survey and utilization of useful/rare local plants by SPREP
- Establishment of the data base of useful/rare local plants based on the results of inventory survey by SPREP
- Identification and experiments of cultivation of useful local plants for food, wood and other purposes by SPC
- Development of utilizing technologies of useful local plants and their extension to the target countries by LRD of SPC

1-2. Activities in the target countries

- Inventory survey of useful/rare local plants in the national parks and protected areas and documentation for the regional data base
- Extension activities of cultivating and utilizing useful/rare local plants

1-3. Consistence with the policies/activities of the regional organizations

Land Resource Division (LRD) of SPC has formulated their strategy titled, "Forest and Tree genetic Resource Conservation, Management and Sustainable Use in Pacific Island Countries and Territories: Priorities, Strategies and Actions, 2007-2015". LRD has been carrying out the experiment of culturing and extending the useful local food crops to the countries where they need. Although their activities are focused on the root crops and fruits for the moment, they intend to expand the target plants to be cultured and provided to the species of non-timber forest products and rare flowers corresponding to inaugurating the new building of Regional Tree Seed Center under the LRD. He proposed program aims to strengthen and expand in their areas within the current strategy and activities of LDR. They request the Japanese ODA to cooperate in the areas of culturing the useful tree species and extending them to the member countries of SPC.

2. Implementing formation considering the lesson learnt:

2-1. Long-term program period

The program is supposed to be continued for two phases (ten years) which is repetition of one phase of five years. SPC has been conducting the culture and extension of useful/rare local plants for years. The program aims to strengthen this activity, which aims to ensure the continuous contribution of SPC in the activities implemented by the proposed program.

2-2. Program advisor and expert

An experienced program formulation/implementation advisor is required to launch this program especially because the formation of this program is a little bit complicated to implement involving two regional organizations at the same level. The advisor is responsible to coordinate between SPC and SPREP and to hold the workshop on inventory and utilization of useful/rare local plants. When it is needed, JICA expert and/or JOCV and JOSV are dispatched to the country.

2-3. Application of the experiences in the past/ongoing JICA projects

PNG has a lot of experiences and knowledge in utilizing the useful tree species which was obtained through the technical cooperation by JICA to the forestry sector in 1990's. Those experiences and knowledge could be utilized in materialize and implement the project.

Program No.4: Institutional development for sustainable management of communal forests through participatory / community-based approach (adaptation)

1. Consistency of the program with the policy of the regional organization:

SPC functions as a center of the program.

1-1. Activities of the regional organization

- Workshop on formulating the participatory/community-based forest management plan and its monitoring
- Issuance of news letter on community forest management to share the updated information among the target countries

1-2. Activities in the target countries

Formulation and implementation of participatory/community-based forest management and its monitoring collaborating with the staff of forestry department. Participatory approach to the forest management is to implement the management of protected areas and forest reserves promoting the participation and cooperation of the community while the community-based approach is to enhance the management by the rural people based on the local customary practices which are consistent with the current government laws and regulations. The basic approach differs according to the ownership and management mode of the target forests.

1-3. Consistence with the policies/activities of the regional organizations

SPC has established "The Pacific Agricultural & Forestry Policy Network (PAFP-Net)" and continuing exchanging the information on the formulation, implementation and monitoring of forest policy through PAFP-Net. Furthermore SPC through PAFP-Net has experiences to hold a workshop on Community-based reforestation in October 2008, which promoted the exchanges of technical information among the member countries.

Institutional development for the participatory/community-based forest management is corresponding to the recent policies in rural and development in those countries. Therefore it is important to formulate and implement the program communicating and collaborating with the relevant departments and organizations in rural development.

Other than the regional program, each country has been carrying out the small scale forest management project by taking approach of community participation or community-based manner. The program also coordinate and collaborate id necessary with such projects as well as supporting the forestry sector of the country.

2. Implementing formation considering the lesson learnt:

2-1. Long-term program period

The whole program period is divided into planning stage and implementation/monitoring and evaluation period. It is implemented as technical cooperation project which continues for six years (repetition of three year phase). It utilizes fully the experiences and lessons obtained by LRD of SPC in implementing former projects. By positioning LRD as a partner organization, the program will have continuous implementing formation of the program even after its completion.

2-2. Program advisor and expert

The program advisor who has enough experiences working in a community project is required to formulate and implement the program. He/she is responsible to coordinate to holding the workshops and its monitoring. When it is needed JICA expert or JOCV/JOSV are dispatched to support the forest department of each country to conduct the activities.

2-3. Application of the experiences in the past/ongoing JICA projects

Although it is from the oceanic area, the experiences and lesson learnt of community-based watershed management in East-Timor could be a good example to launch the proposed program.

Source: The JICA Study Team, April 2009

2.4.2 Country wise project

The proposed country wise projects are listed in the next table. They are proposed according to the specific needs of each country. The detailed information of each project are given from Annex-1 to Annex-7 and the following chapters describe and analyze the current situation of forest ecosystems and the practices of environmental monitoring in the target countries, which provides the justifications to propose the regional programs and country wise projects.

Country wise proposed project

Country	Project	Scheme
PNG	1-1) Forest inventory using satellite data (Mitigation)	Technical cooperation: 3 years, Loan and TA (grant):7 years
	1-2) Development Study on Participatory Forest Management Project (including AR-CDM) (Mitigation)	3 years for formulation of reforestation master plan and pilot project 2 years for implementation of the pilot project
	1-3) Activation of forestry research and education(Adaptation)	Technical cooperation: 10 years
	1-4) Survey and research on biodiversity (Adaptation)	Technical cooperation: 5 years + a
	1-5) participatory management of mangrove forest (Adaptation)	Technical cooperation: 5 years, or Development study: 3 years
Vanuatu	2-1) Forest inventory and formulation of forestry planning	Development study: 2 years
	2-2) Biodiversity conservation through environmental education	Technical cooperation: not less than 10 years,
	2-3) Preparation of National Communication (UNFCCC)	Dispatch of expert: 1 year
Samoa	3-1) Promotion of community-based forest management (Adaptation)	Technical cooperation: 5 years
	3-2) Community based watershed management in the critical watershed(Mitigation/adaptation)	T/A or Development study of 10 years, Development study including pilot project
	3-5) Community-based biodiversity conservation (adaptation)	Technical cooperation: 5 years
Tonga	4-2) Sustainable forest management of the remaining forest (adaptation/mitigation)	Development study including pilot survey
	4-3) Formulation and implementation of watershed management(adaptation/mitigation)	Dispatch of JOCV/JOSV to the forestry department
	4-4) Restoration and rehabilitation of mangrove and littoral forest (Adaptation)	Combination of technical cooperation & dispatch of JOCV
	4-5) Assistance in planting trees in TAX allotments (Adaptation/Mitigation)	Dispatch of JOCV to the Forestry Department
Solomon islands	5-2) Rehabilitation of national herbarium and botanical garden in Honiara (Adaptation)	Cultural grant aid: 2 years
Kiribati	6-1) Audio-visual education on the biodiversity conservation (Adaptation)	Dispatch of JOCV: 2 years
	6-2) IT systems and data base of MELAD (Adaptation)	Dispatch of JOCV: 2years

Source: JICA Study Team, April 2009, The numbers of the projects correspond to those indicated in the table of Annex-1.

3. Papua New Guinea

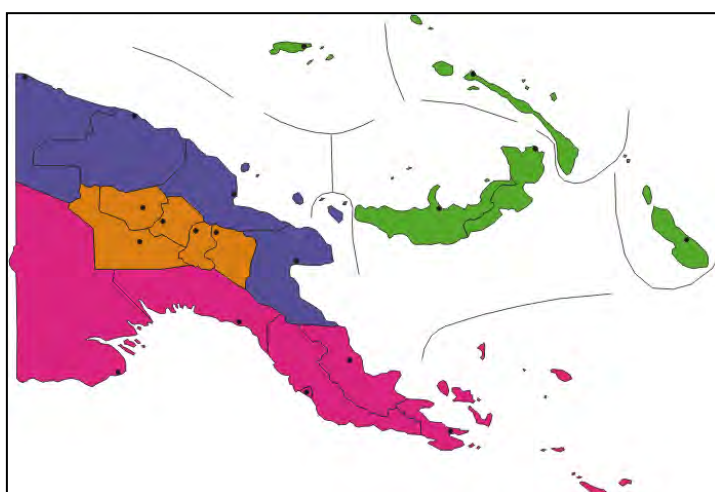
3.1 General

3.1.1 Population and economy

Papua New Guinea is the largest Pacific island country and has the largest tropical natural forest area in Asia-Pacific region. The population in 2007 is estimated at about 6.3 million with the population density of 13.5 person per km². The country is divided into one capital district and 19 provinces, which are grouped into four regions:

List of Regions in PNG

Region	Province	Region	Province
Highland region	<i>Simbu</i>	Momase region	<i>West Sepik</i>
	<i>Eastern Highlands</i>		<i>East Sepik</i>
	<i>Enga</i>		<i>Madang</i>
	<i>Southern Highlands</i>		<i>Morobe</i>
	<i>Western Highlands</i>)	Papua region	<i>National Capital District</i>
Island region	<i>East New Britain</i>		<i>Central</i>
	<i>West New Britain</i>		<i>Oro</i>
	<i>New Ireland</i>		<i>Milne Bay</i>
	<i>Bougainville</i>		<i>Gulf</i>
	<i>Manus</i>	<i>Western</i>	



Regional classification of PNG

- Highland region
- Island region
- Momase region
- Papua region

Papua New Guinea is under toropical monsoon climate and has rainy season (November-April) and dry season (May-October) with some variation by region. The annual

rainfall varies 1,200 – 9,000 mm depending on province. The mean annual temperature is between 35°C degree in daytime and 24°C in the night in the coastal areas and between 28°C in daytime and 14°C in the night in the highland areas.

The economy of the country has been termed a dual economy, cash-based in urban areas and subsistence-based in most of rural areas. Majority of population live in rural areas and depend on subsistence activities for their basic human needs such as gardening, hunting and fishing. The contribution of agriculture, forestry and fishery sectors to GDP is the highest, 38.5% in 2005 of which forestry sector contributed to 9.2%. On the other hand, mineral resource products including natural gas, crude oil, gold, copper, etc. accounted for more than 70% of export value of the country.

3.1.2 Land ownership

The land tenure in Papua New Guinea is broadly classified into three: customary land (95.2%), government land (4.3%), and freehold land (0.4%). The land is owned by clans or sub-clans. The land use right is given to the members of clans or sub-clans or the spouses. They impose severe penalty against the violation of land use right - high compensation or local punishment, such as cultivation of land or construction of houses. The boundary of land is determined based on land use history of each clan and using rivers/streams, ridges, and peaks. However, the customary land tenure becomes a big constraint for promotion of forest development and management due to frequent occurrence of land disputes since there is no official land registration.

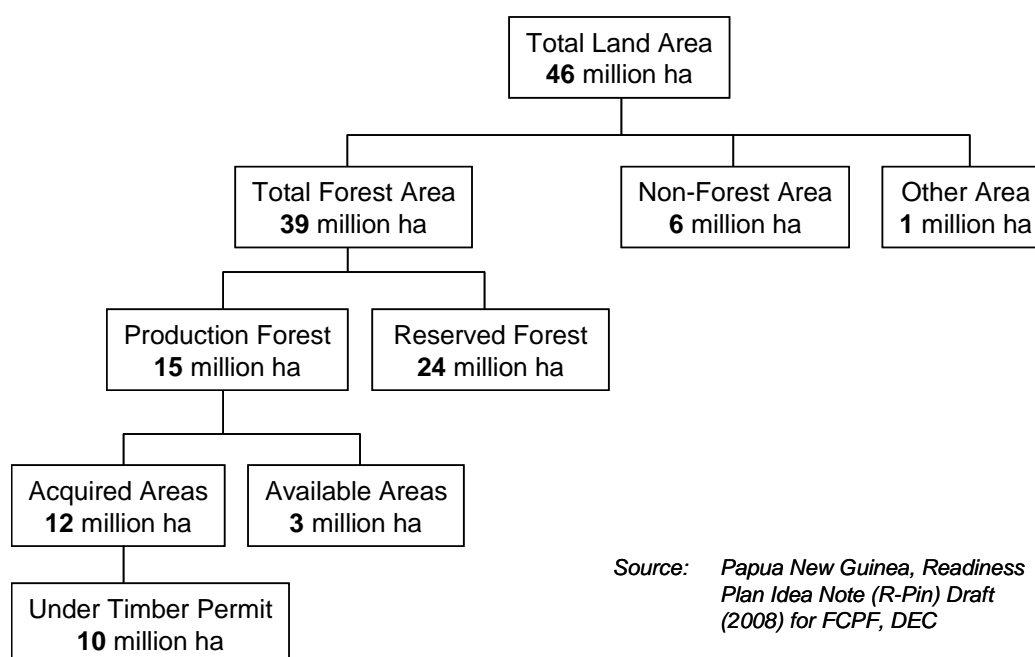
On the other hand, the land disposed from Germany after the 1st World War, purchased from customary land owners or condemned for public purposes are comprised of the government land. Much of the governmental land are leased to foreign-funded companies and used for large plantations, factories and reforestation without serious land disputes. The Open Bay Timber Ltd. in the East New Britain province has managing a large forest plantation on the government land.

3.2 Present conditions of forest ecosystem

3.2.1 Forest and its exploitation

(1) Forest land and forest cover

Out of the total land area of Papua New Guinea (46 million ha), forest land occupies 39 million ha. The classification of the land is shown below. The protection area includes national parks and conservation area.



Source: *Papua New Guinea, Readiness Plan Idea Note (R-Pin) Draft (2008) for FCPF, DEC*

Land Classification of Papua New Guinea

It is said that forest cover of the country has been decreasing due to conversion to agricultural land in lowland and logging operation. However, this is not confirmed yet because forest inventory has not been carried out. According to the survey of satellite data analysis made by the Remote Sensing Center of University of Papua New Guinea¹, the forest cover decreased from 33 million ha in 1972 to 28 million ha in 2002 with average annual decrease of 1.4%. The study also reveals that major drivers identified for the forest change are subsistence agriculture and logging (refer to Annex 2.3 for the results).

(2) Forest exploitation

Foreign companies have played a major role in forest development in PNG. Forest development has been done under three kinds of contracts: Timber Right Purchase (TRP), Local Forest Area (LFA) and Forest Management Agreement (FMA). TRP is a two step contract between the customary land owners and the government and between the government and forest development companies. LFA is a contract between the customary land owners and the forest development companies. Under both contracts, the land owners could receive loyalty from the government or the forest development companies in exchange for selling logging rights. The government and the forest development companies are not required to be responsible for forest management under the contracts.

FMA is a procedure of acquiring forest concessions defined in the Forest Act (1991). Like TRP, it is a two step contract but is different from TRP: (a) it requires development companies to carry out selective harvesting and assist natural regeneration of forest; (b) the contract period is for 50 years, (c) it requires development companies preparing forest management plan every five years, and (d) development companies and the government shall provide the land owners socio-economic services and construct infrastructure.

3.2.2 Ecosystem conservation

Papua New Guinea's tropical rainforest is the second largest intact rainforest ecosystem in the world after the Amazonian rainforest. Though the land area of PNG is less than 1% of the world, PNG is estimated to be home to some 5-7% of the Earth's total biodiversity. There are an estimated 15,000-20,000 plants, 304 mammal, and 762 bird species. The reasons for rich biodiversity in PNG are high rainfalls, fertile soils, and rugged terrains with high mountains which prevent destruction of nature by economic development. However, there are concerns the rich biodiversity would be under threat from forest destruction/ habitat loss caused by population increase and economic development, hunting or collection, competition from invasive species, and effects of climate change.

¹ The State of the Forests of Papua New Guinea: Mapping the extent and condition of forest cover and measuring drivers of forest change in the period 1972-2002, October 2008. This study was funded by UNDP, EU, and etc.

The government has established a total of 52 protected areas following Fauna (Protection and Control) Act (1974) and National Parks Act (1982). However, an IUCN/WWF's review in 1999 reveals that 89% of the protected area have minimal or no management structure.

Protected Areas in PNG

Name	Type	Province	Area (ha)
1. Tonda WMA	WMA	Western	590,000
2. Crater Mountain WMA	WMA	Chimbu, Eastern Highlands, Gulf	270,000
3. Hunstein Range WMA	WMA	East Sepik	220,000
4. Maza WMA	WMA	Western	184,230
5. Kamiali WMA	WMA	Morobe	65,541
6. Crown Island Wildlife Sanctuary	S	Madang	58,969
7. Pirung WMA	WMA	North Solomons	43,200
8. Ramba WMA + Sanctuary	WMA	Madang	57,646
9. Lake Kutubu WMA	WMA	Southern Highlands	24,100
10. Oi Mada Wara WMA	WMA	Milne Bay	22,840
11. Lihir Island	PA	New Ireland	20,208
12. Bagiai WMA	WMA	Madang	13,760
13. Siwi-Utame WMA	WMA	Southern Highlands	12,540
14. Polili WMA	WMA	West New Britain	9,840
15. Garu WMA	WMA	West New Britain	8,700
16. Ndrolowa WMA	WMA	Manus	5,850
17. Klampun WMA	WMA	East New Britain	5,200
18. Mojirau WMA	WMA	East Sepik	5,079
19. Jimi Valley National Park	NP	Western Highlands	4,180
20. Neiru (Aird Hills) WMA	WMA	Gulf	3,984
21. Iomare WMA	WMA	Central	3,828
22. Lake Lavu WMA	WMA	Milne Bay	2,640
23. Tavalu WMA	WMA	East New Britain	2,000
24. Mc Adams National Park	NP	Morobe	1,821
25. Zo-oimaga WMA	WMA	Central	1,510
26. Mt. Kaindi WMA	WMA	Morobe	1,503
27. Variarata National Park	NP	Central	1,063
28. Mt. Wilhelm National Reserve	NP	Western Highlands	817
29. Sawataetae WMA	WMA	Milne Bay	700
30. Balek Wildlife Sanctuary	S	Madang	470
31. Hombareta WMA	WMA	Oro	130
32. Loroko National Park	NP	West New Britain	100
33. Mt. Gahavisuka Provincial Park	PP	Eastern Highlands	77
34. Baiyer River Sanctuary	S	Western Highlands	64
35. Mt. Susu National Reserve Park	NP	Morobe	49
36. Moitaka Wildlife Sanctuary	S	National Capital District	44
37. Baniara Island WMA	PA	Milne Bay	37
38. Namanatabu Reserve	R	Central	27
39. Nuraseng WMA	WMA	Morobe	22
40. Paga Hill National Park Scenic R	NP	National Capital District	17
41. Nanuk Island Reserve	R	East New Britain	12
42. Talele Island National Park Reserve	NP	East New Britain	12
43. Kokoda Historical Reserve	R	Oro	10
44. Cape Worm Memorial Park	MP	East Sepik	2
45. Wewak Peace Memorial Park	MP	East Sepik	2
46. Kokoda Memorial Park	MP	Oro	1
47. Kavakuna Caves	WMA	East New Britain	
48. Sinub Island	WMA	Madang	
49. Laugum Island	WMA	Madang	73
50. Tab Island	WMA	Madang	984
51. Tabad Island	WMA	Madang	16
52. Kau Wildlife Area	Informal	Madang	
		TOTAL	1,643,899

[MP] – Memorial Park, [NP] – National Park, [PA] – Protected Area, [PP] - Provincial Park, [R] – Reserve,
[WMA] – Wildlife Management Area, [S] – Sanctuary
Source: Department of Environment and Conservation

Basic taxonomic information, data about location of habitat, rate of habitat loss, population sizes, and species distribution are incomplete and this affects the management of biodiversity. International

environmental NGOs such as Conservation International, Wildlife Conservation Society, and Nature Conservancy have worked to identify priority areas for conservation and to understand more about the species comprising complex ecosystems. PNG Institute of Biodiversity (PINBio), a government program administered by DEC, also implements activities on biodiversity conservation but their activities are insufficient with annual budgetary allocation of K 500,000 only.

3.3 Relevant policies and regulations

3.3.1 Policy and regulations relating to the forest and biodiversity conservation

(1) Forestry sector

Major forestry policies and regulations are as follow:

Policy/ regulation	Major contents
National Forest Policy (1990)	<ul style="list-style-type: none"> ◆ Approved and issued by National Executive Council in September 1991. ◆ Major objectives of the policy are: <ul style="list-style-type: none"> ➢ Utilization of forest resources to generate economic growth, employment, and greater participation in forestry industry ➢ Management and Protection of forest resources as a renewable asset.
Forestry Act, 1991	<ul style="list-style-type: none"> ◆ Gazetted in June 1992. ◆ It prescribes management and protection of forest resources. ◆ Under the Act, the government signs Forest Management Agreement (FMA) with customary land owners to purchase timber rights and grants the licenses to commercial companies (loyalty will be paid to the provincial government and land owners and the government and permit holder agree to observe environmental conservation) ◆ It prohibits logging and pulling out logs within 20 m from rivers (50m in case of large rivers) ◆ It prohibits logging and pulling out logs on sloping land with 25 to 30 degree. ◆ There shall be prior agreement between the land owners and holders of permit on restoration of forest.
National Forestry Development Guidelines	<ul style="list-style-type: none"> ◆ Issued in September 1993 by the Ministers for Forests. ◆ It provides guidelines on items defined in Forestry Act.
National Forest Plan	<ul style="list-style-type: none"> ◆ NFA prepared it according to Forestry Act. It was approved by the congress in July 1995. ◆ It provides detailed plan for management and utilization of forest resources at national and provincial levels.
Logging Code of Practice	<ul style="list-style-type: none"> ◆ NFA and DEC developed it in 1996. ◆ It prescribes requirements and standards regarding followings to minimize negative environmental impacts and promote sustainable forest management: <ul style="list-style-type: none"> ➢ Planning, designing and construction of forestry roads. ➢ Preparation of logging plans to logging

Policy/ regulation	Major contents
	<ul style="list-style-type: none"> ➤ Waste management ➤ Workshop, fuel storage and fuel servicing ➤ Camp hygiene and safety
Forestry and Climate Change Policy Framework for Action 2008-2015 (Draft)	<ul style="list-style-type: none"> ◆ It directs actions to be taken by forestry sector for climate change issues. It provides seven principles: <ul style="list-style-type: none"> ➤ Ownership of carbon credits ➤ Implementing adaptation measures (such as identifying highly vulnerable forest area and implementing adaptive measures, restoration of forest through reforestation) ➤ Contributing to mitigation to GHG emissions (promotion of AR-CDM projects) ➤ Improving decision-making and good governance ➤ Improving understanding on forestry and climate change ➤ Education and awareness raising on climate change effects ➤ Partnership and cooperation with donors

(2) Ecosystem conservation

Major policies and regulations relevant to ecological conservation are as follow:

Policy/ regulation	Major contents
National Parks Act, 1982	<ul style="list-style-type: none"> ◆ It stipulates: <ul style="list-style-type: none"> ➤ Conservation of fauna and flora and preservation of particular scenic, scientific and cultural importance on state-owned or long-leased land. ➤ Lease and trustee of land by the government for the purpose of environmental protection. ➤ Establishment of national parks and protected areas.
Fauna (Protection and Control) Act, 1966	<ul style="list-style-type: none"> ◆ It stipulates: <ul style="list-style-type: none"> ➤ Establishment of Wildlife Management Areas, protected areas and sanctuaries. ➤ Requirement of consultation with customary land owners when establishing WMA. ◆ It aims at prevention of excessive hunting of wild animals within designated protection areas by land owners, conservation of biodiversity, definition of the ownership of land and resources, provision of opportunities for gaining income from wild animals and for scientific research and education.
Conservation Areas Act (1980, 1992)	<ul style="list-style-type: none"> ◆ Establishment of National Conservation Council (NCC) to authorize conservation areas and guide the management ◆ Establishment of management committee for developing and implementing management plan of conservation areas ◆ Development of a system for terrestrial, coastal and marine conservation areas and protection of lands owned by the government and individuals.

Policy/ regulation	Major contents
	<ul style="list-style-type: none"> ◆ Define survey, negotiation and acquisition of customary land. <p style="text-align: center;">【The Act has not been implemented due to failure to establish NCC】</p>
National Biodiversity Strategy and Action Plan	<ul style="list-style-type: none"> ◆ Issued in 2007 to fulfill the requirement of Convention on Biological Diversity. It has six goals below: <ol style="list-style-type: none"> (1) To conserve, sustainably use, and manage the country’s biological diversity (2) To strengthen and promote institutional and human capacity building for biodiversity conservation, management and sustainable use (3) To strengthen partnership and promote coordination for conserving biodiversity (4) To strengthen existing protected areas and ensure increase in protected areas for terrestrial and marine species to 10% by 2010 and 2012 respectively. (5) To ensure a fair and equitable sharing of benefits arising out of genetic and ecosystem resources. (6) To promote and strengthen research and sustainable development of the country’s biological diversity and resources. ◆ Set up nine programs to achieve the goals. These are prioritized into four categories: <ul style="list-style-type: none"> ■ (1) Policy and registration; (2) financial and technical resources; and (3) human capacities ■ (4) Access and benefit sharing ■ (5) Research and information on biodiversity and (6) in situ and ex situ biodiversity conservation ■ (7) Measures of sustainability of biodiversity use; (8) education and public awareness; and (9) monitoring and evaluation.

(3) International conventions or agreements ratified

Among international conventions and agreements ratified by PNG, those related to forestry and biodiversity are as shown below:

- United Nations Convention to Combat Desertification (UNCCD) - 2000
- Kyoto Protocol to the UNFCCC - 2000
- United Nations Framework Convention on Climate Change (UNFCCC) - 1993
- Convention on Biological Diversity (CBD) - 1993
- Agenda 21 and Rio Declaration - 1992
- Convention for the Protection and Development of Natural Resources and Environment of the South Pacific Region – 1988
- International Tropical Timber Agreement – 1983 and 1994
- Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) - 1973

- Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention) - 1971

3.4 Stakeholder analysis

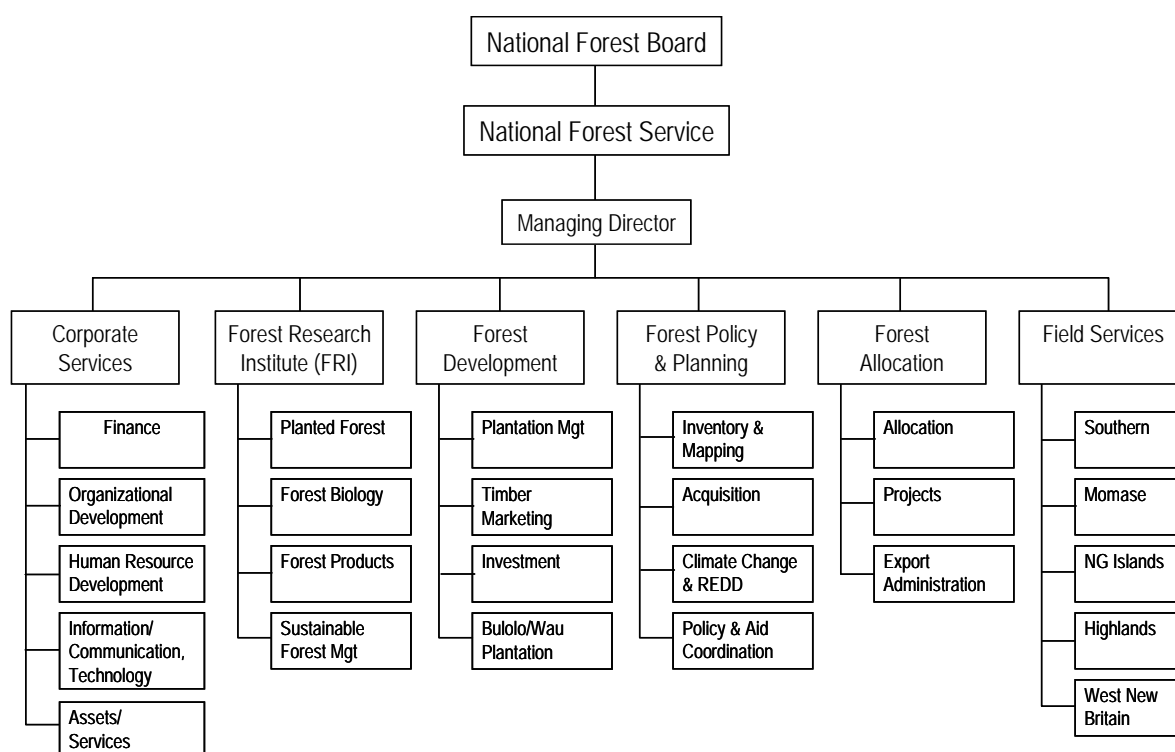
3.4.1 Government organizations related to the sectors

(1) Forestry institutions

PNG National Forest Authority (NFA) was established in 1993 as a statutory body replacing the former Department of Forest, and unifying all Provincial Forest Divisions and the Forest Industries Council. According to the Act, NFA is responsible for preparation, implementation and enforcement of forest policies and regulations for management, development and protection of the forest resources and environment of the country. It has the headquarter in Port Moresby and 19 provincial offices including five regional offices with the total staff of about 430. Forest Act (1991) defines the functions of NFA as follow:

- Environmental policy development and advice to the government
- Preparing and reviewing the National Forest Plan
- Make recommendations to the national forest board on the granting of licenses and leasing of lands in accordance with Forestry Act
- Signing FMA with customary land owners
- Selection of logging companies and negotiation for acquisition of timber concessions
- Control and regulation of the exports of forest products
- Administration of Forestry Act and forest policies and regulations
- Participation in international conferences on forest on behalf of the government

NFA is comprised of National Forest Services (NFS), the operating and implementing arm of NFA, and National Forest Board (NFB) which gives direction to NFS and advises the Minister for Forests on forest policies and legislations. The organization structure is illustrated below:



Organizational Structure of NFA

Forest Research Institute (FR) is the research arm of NFA and located in Lae. The research topics include improvement of germplasm of tree species for increased productivity and profitability, sustainable management of forest plantations, improvement of productive value of land and supply of environmental services, exploitation and development of non-timber forest products (NTFP), etc. Japanese government constructed NRI building and relevant facilities under grant aid program in 1987. Then JICA implemented Forest Research Project from 1989 to 2002.

University of Technology (UNITEC) is located in Lae and has Forest faculty. Bulolo Forestry College provide education to 2nd and 3rd grade students belonging to the Forest faculty of UNITEC. Timber and Forestry Training College is also under UNITEC and provides short- and long-term vocational trainings on logging and timber processing.

Department of Environment and Conservation (DEC) is responsible for forest conservation and implementing environmental impact assessment of forest development projects.

Provincial Forest Management Committee also involves in forest development and management in terms of coordination between customary land owners and NFA to mediate disputes in forest development.

(2) Institutions related to ecological conservation

Department of Environment and Conservation (DEC) is responsible for environmental planning, assessment and protection as well as nature conservation and has following functions:

- Development of environmental policy

- Environmental impact assessment of major development projects including forestry and mining development
- Administration of environment protection registration and regulations
- Conservation of flora and fauna
- Management of water resources
- Establishment and management of national parks and protected areas
- Administration of PNG’s international agreements

School of Natural and Physical Science, University of Papua New Guinea has been carrying out researches on climate change, forest and biodiversity, and capacity development of stakeholders with financial assistance from the government, donors and NGOs.

Aside from above, FRI, National Research Institute (NRI) and UNITEC also conduct studies and researches on ecology and biodiversity.

(3) Climate change institution

Office of Climate Change and Environmental Sustainability (OCCES) is a new organization established in 2008 under the Office of the Prime Minister to coordinate the climate change-related activities implemented by government agencies. So far, OCCES focuses on REDD (Reducing Emissions from Deforestation and Forest Degradation) and has worked on development of relevant framework and strategy with donor’s assistance.

OCCES also serves as DNA (Designated National Entity) for UNFCCC that approves CDM projects. However, they don’t finalize and approve “forest definition” which is prerequisite for approving AR-CDM.

3.4.2 Donors and international organizations

(1) Forestry

So far, assistance of major donors has concentrated on REDD issues. AusAID, UNDP and the World Bank announced establishment of fund for mitigation and adaptation of climate change effects. They have assisted development of relevant policies and strategy and capacity building but no field activity has been supported yet. No forestry-related project and program has been formulated so far. AusAID and UNDP have provided small grants for community-based forest-related activities sporadically.

Brief features of some forestry projects in the past (completed or cancelled) are summarized below:

Project name	Brief features of the project
Forest Conservation Project (World Bank)	<ul style="list-style-type: none"> ◆ The total cost of the project was US\$ 39.3 millions including US\$ 17.4 millions of loan and GEF grant of US\$ 17 millions. ◆ The objectives of the project are (1) capacity development of the government, NGOs and local community on sustainable forest management and protection and (2) improvement of the quality of life ◆ The project components include (1) capacity development of customary

Project name	Brief features of the project
	<p>land owners to improve decision-making (including their organizing and designating protected area), (2) setting up conservation fund, (3) sustainable forest management (review of large scale logging operation, forest inventory and support for forest development plan preparation)</p> <ul style="list-style-type: none"> ◆ The project was commenced in 2003 but suspended in September 2003 due to non-compliance with loan covenants. The project was cancelled in June 2005 due to two issues on issuance of timber licenses was not resolved although other six issues was resolved.
Application of GIS to Land-use Management in PNG: Remote Sensing Land Use Initiative (UNDP)	<ul style="list-style-type: none"> ◆ The total cost of the project was US\$ 1.8 millions sourced from UNDP, GTZ, EU, Conservation International and University of PNG. ◆ The project started in November 2002 and completed at the end of 2006. ◆ The Remote Sensing Center of UPNG analyzed the extent of forest cover change between 1972 and 2002 using satellite data. The Center published a report titled “The State of the Forests of Papua New Guinea” in October 2008.

(2) Ecosystem conservation

GEF has funded some biodiversity conservation projects in PNG, mostly capacity development project.

Project name	Donor	Status
Biodiversity conservation and resource management	GEF/UNDP	Completed
Community-based coastal and marine conservation in the Milne Bay province	GEF/UNDP	on-going
South Pacific Biodiversity conservation programme (<u>regional</u>)	GEF/UNDP	Completed
Prevention, control and management of invasive alien species in the Pacific Islands (<u>regional</u>)	GEF/UNEP	Pipelined

(3) Climate change

UNDP has been working on preparation of PNG REDD Readiness Roadmap – plan of donors’ assistance to REDD issues – together with AusAID and members of the task force. Following matrix shows the components and activities compiled in the draft Roadmap as of December 2008. According to OCCES, NFA and OCCES reached a consensus that NFA will work on components 2 and 3, while OCCES on the remaining four components. However, there is no agreement yet on which donors shall work on what component or activities.

Components	Expected Outcomes
1. Management of Readiness	<ul style="list-style-type: none"> ◆ Stakeholders engaged in all aspects of the process. ◆ Readiness Roadmap finalized ◆ Institutional capacity to manage Readiness framework in place ◆ Management arrangement between GoPNG and development partners agreed and functioning
2. Reference scenario of	◆ Robust methodology selected and applied to clarify historical

Components	Expected Outcomes
forest emissions	<ul style="list-style-type: none"> deforestation emission levels ◆ Robust methodology selected and applied to estimate historical forest degradation ◆ Improved data sets applied to reference scenario considerations ◆ Carbon monitoring system defined
3. Monitoring and reporting	<ul style="list-style-type: none"> ◆ Carbon monitoring system defined ◆ Multipurpose forest inventory conducted ◆ Adequate institutional capacity established to undertake regular forest carbon monitoring and reporting consistent with REDD information needs ◆ National carbon accounting system developed ◆ Internationally accepted independent verification
4. Identification of REDD Strategy	<ul style="list-style-type: none"> ◆ National REDD Strategy process launched at an operational level ◆ Drivers of deforestation and degradation assessed ◆ Candidate activities for REDD identified ◆ Forest sector investment and capacity building requirements defined ◆ Priority areas for biodiversity and livelihood co-benefits analyzed
5. REDD implementation Framework	<ul style="list-style-type: none"> ◆ Institutional capacity to implement REDD framework in place ◆ Legislative framework strengthened ◆ Mechanism to channel REDD finance established ◆ Benefit sharing model agreed
6. Stakeholder participation	<ul style="list-style-type: none"> ◆ Stakeholder engagement process functioning ◆ Stakeholder engagement in all aspects of the process ◆ Conflict resolution and redress mechanism

3.5 Needs assessment

3.5.1 Policy direction in relation to combating climate changes

OCCES is responsible to formulate the National REDD Policy supported by UNDP and Aus AID. Other than this the Government drafted Forestry and Climate Change Policy Framework for Action 2008-2015. The followings are the summary of the draft Policy.

Policy/ regulation	Major contents
Forestry and Climate Change Policy Framework for Action 2008-2015 (Draft)	<ul style="list-style-type: none"> ◆ It directs actions to be taken by forestry sector for climate change issues. It provides seven principles: <ul style="list-style-type: none"> ➢ Ownership of carbon credits ➢ Implementing adaptation measures (such as identifying highly vulnerable forest area and implementing adaptive measures, restoration of forest through reforestation)

	<ul style="list-style-type: none"> ➤ Contributing to mitigation to GHG emissions (promotion of AR-CDM projects) ➤ Improving decision-making and good governance ➤ Improving understanding on forestry and climate change ➤ Education and awareness raising on climate change effects ➤ Partnership and cooperation with donors
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3.5.2 Possible intervention required

The mission studied the needs of the country on climate change mitigation and adaptation by the interviews to the government agencies concerned such as NFA, Universities and research institutes as well as through field reconnaissance. The results are summarized below. The brief features of the projects proposed by the mission are presented in Annex 2.2.

Opinions and needs of agencies concerned	Assessment and proposal by the mission
<p>【NFA】</p> <ul style="list-style-type: none"> ◆ There were a lot of discussions on REDD but can not see the prospect. ◆ <u>NFA wants to grasp in certain accuracy the forest resources through forest inventory for long-term forest development and management plan.</u> (The cancelled world bank-funded project, Forest Conservation Project, had a forest inventory component) ◆ Forest inventory shall involve satellite data analysis and field survey. NFA expects technical transfer on satellite data analysis technique. 	<ul style="list-style-type: none"> ✓ Forest resources are one of the major income sources of the country. Hence, it is important to grasp the resource availability for forest development and management planning. Such plan is also required by forest policy and regulation. ✓ NFA has a mapping unit under forest planning directorate with two GIS technicians. NFA plans to add two staff to the unit and let the staff acquire satellite data analysis technique. ✓ Commercial timber companies such as Open Bay Timber Ltd. expect to be provided forest resources data and GIS data by NFA for improving their operation and management. ✓ <u>Propose to assist forest inventory using satellite data analysis and field survey (see Annex 2.2)</u> ✓ It is recommendable to involve students and teachers of the forest faculty of UNITEC and Bulolo forestry college in the field survey of the inventory for OJT.
<p>【NFA, OCCES, Bulolo Forestry College and NRI】</p> <ul style="list-style-type: none"> ◆ Unused grassland mainly extends over highland region and the needs of reforestation there is high. ◆ Development of AR-CDM projects have started in Eastern Highland province. Technical assistance to AR-CDM project formulation is necessary. 	<ul style="list-style-type: none"> ✓ There are about 3.2 million ha of unused grassland extending over highland region. ✓ The unused grassland is suitable for AR-CDM in terms of land eligibility – no forest existed for long time. ✓ No land owner would raise an objection for economic use of their land through reforestation. ✓ Draft Forestry and Climate Change Policy


Opinions and needs of agencies concerned	Assessment and proposal by the mission
 <p data-bbox="225 730 750 757">Unused grassland observed between Lae-Bulolo</p>	<p data-bbox="852 300 1404 360">Framework for Action 2008-2015 prioritizes implementation of AR-CDM projects.</p> <ul style="list-style-type: none"> <li data-bbox="810 376 1404 528">✓ Proposed to implement a Development Study on community-based reforestation and forest management project including environmental education and awareness raising to land owners and local people. (see Annex 2.2)
<p data-bbox="188 779 300 806">[UPNG]</p> <ul style="list-style-type: none"> <li data-bbox="193 831 788 920">◆ It is necessary to conduct studies and research on biodiversity in PNG because it is under threatened. <li data-bbox="193 943 788 1032">◆ <u>Desire to conduct inventory of fauna and flora and research on the conservation in coordination with Japanese universities.</u> 	<ul style="list-style-type: none"> <li data-bbox="810 824 1404 913">✓ Research on biodiversity is one of the main objectives of “National Biodiversity Strategy and Action Plan. <li data-bbox="810 936 1404 1025">✓ <u>Propose to implement Technical Assistance Project in a form of ODA-Academia collaboration (see Annex 2.2)</u>
<p data-bbox="188 1048 526 1075">[UPNG, NFA and OCCES]</p> <ul style="list-style-type: none"> <li data-bbox="193 1099 788 1189">◆ Mangrove forest has been decreasing and degraded due to increase of firewood demand by population increase. <li data-bbox="193 1211 788 1301">◆ Mangrove forest effectively prevents or minimizes shoreline erosion by high tide and extreme weather. <li data-bbox="193 1323 788 1413">◆ OCCES agreed to promote mangrove plantation as an adaptation measure against climate change. 	<ul style="list-style-type: none"> <li data-bbox="810 1099 1404 1211">✓ The mission could not obtain data on the areas of mangrove deforestation and degradation. Matupori island research station of UPNG has such data according to UPNG. <li data-bbox="810 1234 1404 1413">✓ Propose to implement mangrove reforestation project with community participation including awareness raising and support to livelihood development, provided deforestation and degradation of mangrove forest could be confirmed. (see Annex 2.2)
<p data-bbox="188 1433 630 1460">[FRI and Bulolo Forestry College]</p> <ul style="list-style-type: none"> <li data-bbox="193 1485 788 1552">◆ FRI desires activation of forest researches by JICA assistance. <li data-bbox="193 1574 788 1664">◆ Research needs and topics have been extending to socio-economic aspects as community-based forestry has been gradually popular in PNG. <li data-bbox="193 1686 788 1798">◆ For AR-CDM and REDD, it is necessary to develop growth tables and volume tables of major tree species and study the estimation of forest carbon stock. 	<ul style="list-style-type: none"> <li data-bbox="810 1485 1404 1597">✓ Activation of forest research is required and matches to national development policies as the country relies on forest resources for national income as well as basic human needs. <li data-bbox="810 1619 1404 1686">✓ Propose to assist forestry research and education (see Annex 2.2)

Table 3.1 Potential Interventions/Programs relating to “Conservation of Forest Ecosystems and Environmental Monitoring”

No.	Development Needs	Possible interventions	Type of Measures	Potential target sites	Applicable JICA's Schemes	Related Donors	Relevance to polices	Necessity	Urgency	Priority
1	Forest inventory using satellite data	Forest inventory by the combination of the interpretation/analysis of high resolution satellite image and field survey Preparation of forest maps (~1/10,000) Establishing data base of forest resources Collecting data on carbon emission or absorption	Mitigation	Priority area where forest development is on-going	T/A project and loan project	UNDP World Bank FCP (cancelled)	High	High	High	High
2	Development study on participatory forest management project	Awareness raising to land owners and local governments on economic use of unused grassland Preparation of a master plan of reforestation and forest management Development of PDD for registration of AR-CDM project Planning and implementation of the pilot project	Mitigation	Highland regions where unused grassland is dominant	Development study including the pilot project	World Bank FCP (cancelled)	High	High	High	High
3	Activation of forestry research and education	Selection, propagation and extension of species for reforestation Developing volume and growth table Expansion and improvement of seed center Researches on socio-economic aspects of forestry Conducting forestry research and education reflecting the needs of private sector	Adaptation	Lae (FRI, UNITEC, TFIC)	T/A project	NIL	High	High	High	High
4	Survey and research on biodiversity	Inventory survey of existing fauna and flora Identification of new species Ecosystem survey of existing fauna and flora Presentation of rare and endangered species	Adaptation	To be selected	T/A project in collaboration of Japanese university	NIL	High	Medium	Medium	Medium
5	Participatory management on mangrove forest	Survey on the land suitable for mangrove plantation Awareness raising to land owners and local community Planting mangroves with participation of land owners and community Development of PDD for AR-CDM (if possible and desirable) Formulation of the plans for income generation and pilot projects	Adaptation	To be selected	T/A project or development study	NIL	Medium	Medium	Medium	Medium

4. Vanuatu

4.1 General

4.1.1 Location and population

Vanuatu consists of more than 100 volcanic islands stretching over 1,300km from north to south. The country has two main seasons: a hot and wet period from November to April (the main cyclone period) and a cooler and drier period from May to October. The average annual rainfall is about 2,300 mm and average annual temperature is 26°C in Port Villa. The northern islands tend to be wetter than the southern areas. Vanuatu is subject to extreme climate events including storm surges, coastal inundation, flooding, landslides, and hailstorms.

Vanuatu's population in 2006 is estimated at about 210,000. About 80% of the population resides on flatter terrain near the coast.

Demographic data of Vanuatu

Province	Households		Population		Area (Km ²)	Density (2006)
	1999	2006	1999	2006		
Shefa	10,888	12,870	54,439	68,706	4,262.1	16.1
Sanma	6,970	8,272	36,084	41,596	1,507.4	27.6
Malampa	6,483	7,348	32,705	34,925	2,808.4	12.4
Penama	5,371	6,447	26,646	26,676	1,203.9	22.2
Tafea	5,364	6,577	29,047	29,398	1,632.2	18.0
Torba	1,339	1,798	7,757	8,620	867.3	9.9
Total	36,415	43,312	186,678	209,920	12,190	17.2

Source: Population and Housing Census 1999, Agricultural Census 2006, and Statistical Yearbook of 2002

4.1.2 Livelihood and economy

Over 75% of the population lives in rural areas and is dependent on subsistence or commercial agriculture. The main agricultural products are beef, cocoa, coffee, copra, and kava. Local production of yams, cassava, breadfruit, vegetables, fruit and nuts mainly supply domestic markets. Subsistence agriculture based on slash and burn rotation and cultivation techniques is becoming increasingly unsustainable as the rotation cycle is shortened due to population growth, establishment of large plantations, and leasing of prime land for residential and tourism development.

The agriculture and forestry (and fisheries) sectors account for around 15% of total GDP and for almost all merchandise exports from Vanuatu. These sectors are now the most important sectors of the Vanuatu economy not only because they constitute the means for survival for more than 75% of the population but more importantly, these sectors have much potential for future expansion. Apart from tourism as the main source of revenue, The government has identified these primary sectors as priority. The government is therefore increasing the allocation of resources to their development. The government policy in agriculture and forestry emphasizes (a) market access and trade facilitation, (b)

increased production, (c) bio-security, and (d) value adding and agro-processing. The government is encouraging increased private sector involvement and active participation of Ni-Vanuatu in agribusinesses.

4.1.3 Land ownership

According to the national constitution, all land belongs to indigenous customary owners and rules of custom are the basis for determining the ownership and use of land. The government is required to protect the rights of customary land owners and to approve the transaction of land between the customary land owners and those who want to buy the land. The constitution also defines the rights of the government to condemn the land for public purposes and to allocate lands to indigenous tribes. The customary land ownership becomes a constraint to agriculture and forestry development and infrastructure construction funded by foreign companies in rural areas.

4.2 Present conditions of forest ecosystem

4.2.1 Forest and its exploitation

(1) Forest land and forest cover

The forest data in Vanuatu has not been verified and updated for about two decades since AusAID assisted forest inventory (1989-1994) based on the interpretation of the 1988 aerial photographs. According to the inventory, natural forest cover in Vanuatu (444,000 ha) is estimated at 36% of the total land area. Most of the high value forests were over-exploited in the 1980s and 1990s, until the Government was forced to impose a ban on the export of round logs in 1998. Such forest exploitation as well as forest clearance for agriculture mainly occurred in narrow coastal plains because interior terrain is too steep and rugged to make logging economically feasible.

Vegetation Type in Vanuatu

Vegetation	Area (ha)	% of Land Area
Mid-height forests (20-30 m)	205,307	16.7%
Low forest (10-20 m)	234,089	19.1%
Woodlands (< 10 m)	386	0.0%
Thickets (3-8 m)	433,941	35.4%
Scrub (< 3 m)	45,018	3.7%
Grassland	51,128	4.2%
Swamp communities	2,261	0.2%
Mangroves	2,519	0.2%
Bare, agriculture, inhabited	252,258	20.6%
合計	1,226,905	100.0%

Source: ACIAR 1997 quoted in ADB 2007.

Mangrove forest in Vanuatu is only 2,750 ha because shoreline sediments are not highly consolidated and frequent storm surges and cyclones often redistribute sediments.

(2) Forest exploitation

Until the 1990s, log harvesting activities were undertaken by the medium scale logging companies, acquiring licenses for harvesting of more than 100,000 cubic meters of logs per year. The most important timber species are whitewood (*Endospermum medullosum*) and melektri (*Antiaris toxicara*). These constitute around 90 percent of the harvested trees. Harvesting is mainly based on a selection system (targeting whitewood and melektri) The medium logging activities was already scaled down and the main logging activities have been undertaken by portable or mobile sawmills for local use. Most logging is currently concentrated on the island of Espiritu Santo.

The National Forest Policy (1997) provides as the Government’s guideline toward management of all forests in Vanuatu including forest conservation, reforestation activities and forest plantation establishment. The policy estimated the sustainable yield per island which forms the guideline for issue of timber licenses to both fixed mills and mobile sawmills.

Annual sustainable yield per island as indicated by the National Forest Policy

Islands	Sustainable Yield (m ³ /year)
Banks/Torres	9,700
Santo/Malo	30,000
Ambae/Maewo	3,500
Pentecost	1,800
Malakula	6,500
Ambrym	1,000
Epi	1,000
Efate	6,500
Tanna/Aneityum	2,000
Erromango ^d	6,000
Total	68,000

The Forestry Act of 2001 sets the legal requirements for the sustainable management of natural forests in Vanuatu. The Act requires that all forests in Vanuatu are harvested under the requirement of a Timber License. Timber harvesting in natural forests in Vanuatu are based on a selective logging system, for which certain species of timber can only be harvested when they reach or exceed the minimum harvestable diameter at breast height (DBH).

An important tool for natural forest management in Vanuatu is the Vanuatu Code of Logging Practice. The Code sets the minimum guideline for all forest harvesting in Vanuatu. These guidelines do not only cover sustainable forest management principles, but it also contained measures to ensure ecological sustainability and the overall well being of the forest. The Code which forms part of a Timber License conditions sets minimum operational standards and requirements for the forest. These requirements include directional felling to avoid damage to future potential crop trees and environmentally sensitive areas, limit disturbances to surrounding environments, limit traction to soil and sedimentation to the water system.

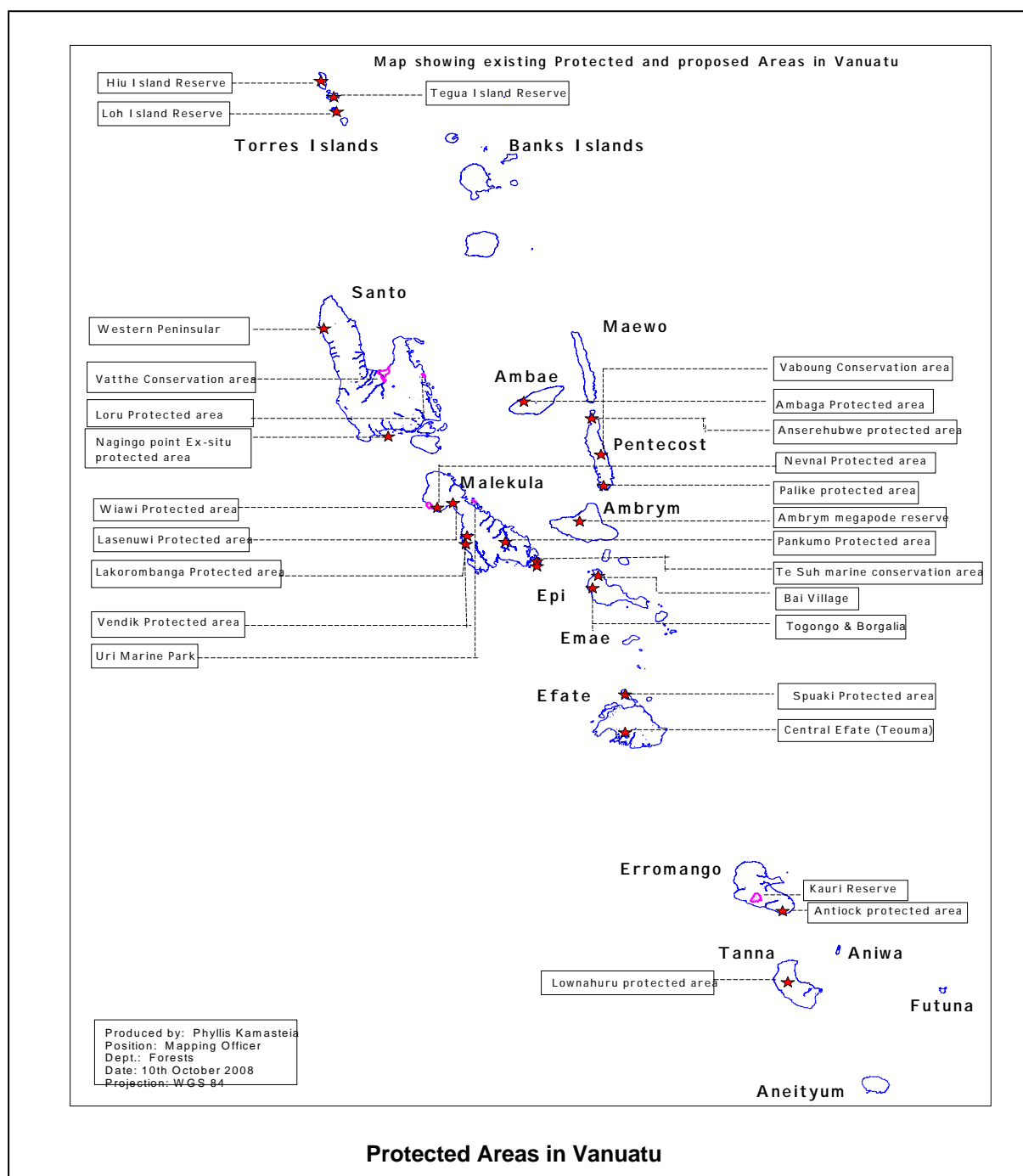
Planting high value tree species such as sandalwood and whitewood has become an important initiative for landowners and communities to participate in sustainable forest management activities. The forestry stakeholder group has been actively participating and taking the lead in reforestation activities in the last four to five years. Woodlot establishment has been undertaken through the agro-forestry farming system. Agro-forestry is a traditional farming system which is still widely used to date. There are some farmers who produce tree seedlings using self-collected seeds under technical assistance of forestry officer in order to expand their woodlot as well as for the sales of the seedlings produced. It is expected that the ongoing reforestation effort would be continued and a fair amount of forest products would be supplied from planted forests in the next 15 to 20 years.

4.2.2 Ecosystem Conservation

The World Conservation Union (IUCN 2006) reported that a total of 34 species in Vanuatu are listed in its Red Data Book of threatened species, broken down as follows: 5 for mammals; 8 for birds; 2 for reptiles; 7 for fishes; 2 for mollusks; and 10 for plant species.

The primary threats to biodiversity in Vanuatu include (i) over-exploitation of marine and terrestrial resources; (ii) unsustainable logging and deforestation; (iii) poor agricultural and livestock ranching practices; (iv) natural disasters; (v) introduction of alien species; (vi) intensified frequency of burning for slash and burn agriculture; (vii) infrastructure development; and (viii) global warming. Insufficient budget allocation for conservation activities is also one of the threats to biodiversity. Expansion of alien species, particularly vines, has been increasing prominent these days. Biological extermination of alien species was experimented. The government strengthens monitoring and quarantine to prevent invasion of alien species.

Vanuatu ratifies the Convention on Biological Diversity (CBD). Protected areas established for conservation of biodiversity including marine protected area cover more than 8,700 ha, most of which are managed by the land owners by their own initiatives.



4.3 Relevant policies and regulations

4.3.1 Policy and regulations relating to the forest and biodiversity conservation

(1) Forestry sector

Major forestry policies and regulations are as follow:

Policy/ regulation	Major contents
National Forest Policy (1997)	<ul style="list-style-type: none"> ◆ Became effective in 1998. ◆ Major objectives of the policy are promotion of increase revenue generation from forestry sector, creation of job opportunities, preservation of the country's cultural heritage and the contribution to the welfare and economic development of the people. ◆ The principle features include: <ul style="list-style-type: none"> ➢ A strong national commitment to sustainable forest management ➢ Forest-based rural development leading to greater significance on forestry in the country ➢ Comprehensive land use and forest planning ➢ Increased national forest resources through improved natural forest management and plantation establishment ➢ Improved awareness of the value of forests and trees and greater participation by ni-Vanuatu in the development, management and conservation of the resources ➢ Set out the annual sustainable quota for each island
Forestry Act (2001)	<ul style="list-style-type: none"> ◆ The act makes provision for protection, development and sustainable management of forests and the regulation of the forestry industry in Vanuatu covering: <ul style="list-style-type: none"> ➢ Forestry sector planning for efficient and effective management of the forests ➢ Agreement for forest development, timber license, timber permit and other licenses ➢ Environment protection ➢ Reforestation ➢ Export of forest products
Sandalwood Regulation	<ul style="list-style-type: none"> ◆ Gazetted in 1997, the regulation sets out requirements applicable to the sandalwood growing in the wild. <ul style="list-style-type: none"> ➢ Issuance and management of sandalwood license ➢ Declaration and management of annual sandalwood trading season ➢ Management of sandalwood disputes
Sandalwood Policy	<ul style="list-style-type: none"> ◆ Became effective in 2003. ◆ Prior to the establishment of the policy, sandalwood industry was purely a sandalwood log exporting industry. The low royalty rates to landowners did not provide enough incentive for sandalwood replanting. The policy requires that sandalwood licenses be issued only to operators willing to process sandalwood in Vanuatu and only export sandalwood oil. This resulted in a decrease in sandalwood licenses from five to two. The increases in the export value of sandalwood oils have raised the royalty rates. The high sandalwood royalty rates have then become an incentive for increased interests and involvement of ni-Vanuatu in planting sandalwood.

Policy/ regulation	Major contents
Logging Code of Practice	<ul style="list-style-type: none"> ◆ It was introduced in 1998 and requires compliance with a number of forest management conditions relating to harvesting. For example, <ul style="list-style-type: none"> ➢ All harvesting must be carried out in accordance with an approved harvesting plan ➢ Watercourse protection by leaving buffer strips along watercourses ➢ Post logging restoration ◆ Full industry compliance with the code was achieved at the end of 2000. ◆ Associated Reduced Impact Logging Guidelines ensures the minimum impact on surface soil, water and forest through the use of proper machines and during felling operations.
Priorities and Action Agenda for Vanuatu 2006-2015	<ul style="list-style-type: none"> ◆ It is similar to national development plan covering all sectors. ◆ In the primary production chapter, maintain and improve the regulatory and management framework for sustainable development of forestry sector is prioritized through: <ul style="list-style-type: none"> ➢ Improved institutional capacity in the Department of Forestry ➢ Preparation of a forest inventory update and sector plan update ➢ Effective enforcement of the Code of Logging Practice

(2) Ecosystem conservation

Major policies and regulations relevant to ecological conservation are as follow:

Policy/ regulation	Major contents
National Park Act (1993)	<ul style="list-style-type: none"> ◆ Became effective in 1995. ◆ Provides for declaration, protection, and preservation of national parks and nature reserve. <p>【the act has not been implemented】</p>
Wild Bird Protection Act (1989)	<ul style="list-style-type: none"> ◆ These acts provide regulations for protection and trade of wild life and animal and biological products.
International Trade (Fauna and Flora) Act - 1989	
Convention on Biological Diversity (Ratification) Act - 1992	
Animal Importation and Quarantine Act (1988)	
Environmental Management and Conservation Act (2002)	<ul style="list-style-type: none"> ◆ The Act provides for: <ul style="list-style-type: none"> ➢ EIA procedures ➢ Procedures of application for permit required for biodiversity investigation ➢ Establishment of Community Conservation Area
National Biodiversity Conservation Strategy (1999)	<ul style="list-style-type: none"> ◆ It was prepared in 1999 with six objectives: <ul style="list-style-type: none"> ➢ Sustainable management and conservation of biodiversity ➢ Appropriate policy, planning and legal mechanisms

Policy/ regulation	Major contents
	<p style="text-align: center;">for the management of biodiversity</p> <ul style="list-style-type: none"> ➤ Improved knowledge about biodiversity ➤ Adequate capacity of national, provincial, NGO and community organizations to manage biodiversity ➤ Increased local awareness of the importance and value of biodiversity ➤ Community participation in the management and conservation of biodiversity

(3) International conventions or agreements ratified

Among international conventions and agreements ratified by Vanuatu, those related to forestry and biodiversity are as shown below:

- United Nations Convention to Combat Desertification (UNCCD) - 1998
- Kyoto Protocol to the UNFCCC - 2001
- United Nations Framework Convention on Climate Change (UNFCCC) - 1992
- Convention on Biological Diversity (CBD) - 1993
- Convention for the Protection and Development of Natural Resources and Environment of the South Pacific Region (signed in 1986 but not ratified yet)
- International Tropical Timber Agreement
- Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) - 1989

4.3.2 National Adaptation Program of Action (NAPA)

The National Action Programme for Adaptation (NAPA) was completed and approved by Cabinet in 2007. The priority projects in NAPA are (i) agriculture and food security; (ii) water management; (iii) sustainable tourism; (iv) community-based marine resource management; and (v) sustainable forest management. EU Global Climate Change Alliance (GCCA) and the World Bank already committed to provide US\$ 100,000 for preparation of the detailed plan of the priority projects. NACCC is currently preparing a Climate Change Policy and Implementation Strategy.

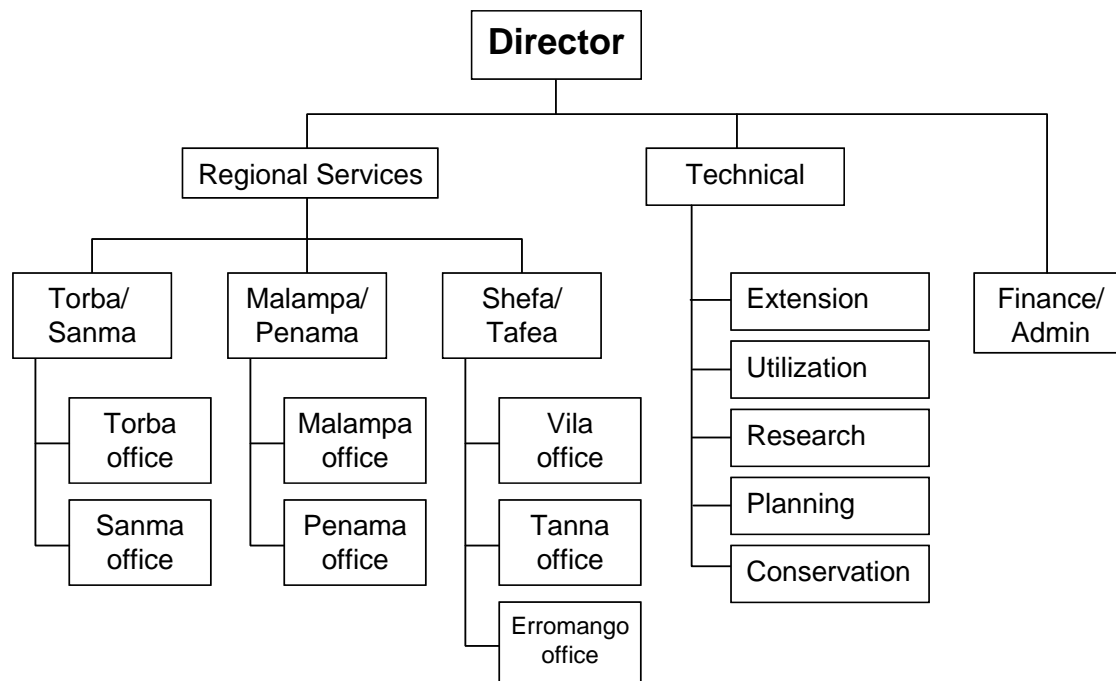
4.4 Stakeholder analysis

4.4.1 Government organizations related to the sectors

(1) Forestry institutions

Department of Forest under Ministry of Agriculture, Quarantine, Forestry and Fisheries is responsible for overall administration of forestry sector. The department has the headquarter in Port Villa, three regional offices and seven field offices over the country. There are in total 42 staff positions in entire department and less than 40 positions are filled because some staff are studying abroad. The main

functions of the forest department are (1) issuance of timber licenses, (2) monitoring of harvesting, (3) provision of advice on the possibility of investment in the forestry sector, (4) plantation site selection, (5) production and distribution of seedlings, (6) technical advice on tree planting, (7) estimation of timber volumes, (8) selection of conservation/ reserve areas, (9) development and implementation of forestry policy. The department could temporary mobilize their limited number of staff to certain projects, i.e. forest inventory that requires certain number of staff for field survey, using the project budget when necessary, according to the department officer.



Organizational Structure of the Department of Forestry

Provincial governments also involve in forestry administration in terms of support to the forest department regarding advices to local people on forestry operation, provision of business licenses and promotion of forest industry. Similarly, Departments of Land and Agriculture, and Environment Unit of Ministry of Land and Natural Resources support the forest department in terms of land use planning, agro-forestry promotion, and forest protection,

(2) Institutions related to ecological conservation

The Environment Unit of the Ministry of Lands and Natural Resources has overall responsibility for environment in general including ecological conservation. The number of staff in the Environment Unit is only four including Acting Director and the staff in charge of EIA, biodiversity and administration/finance. Environmental Management and Conservation Act (2002) recommends creation of a Department of Environment and Conservation. The recommendation is not materialized yet due to insufficient budget allocation. The Acting director said that they schedule to promote the Environment Unit to the Department this year by adding two staff to be responsible for environmental compliance and Santo Island.

The Environment Unit is a focal point of international environmental conventions and agreements such as the Convention on Biological Diversity and United Nations Framework Convention on Climate Change (UNFCCC).

(3) Climate change institution

National Advisory Committee for Climate Change (NACCC) was established in 1989 as a coordination body on climate change issues. The membership of the NACCC shall include: Meteorological Services Department, Foreign Affairs Department, Environment Unit, Department of Fisheries, Department of Economic and Social Development, Department of Agriculture, Energy Unit, Department of Land Survey, Land Use Planning Office, Department of Forestry, Department of Health, National Disaster Management Office, Department of Quarantine and Inspection Services, Vanuatu National Council of Women, and a representative of Vanuatu Non-Government Organizations. NACCC involves in all climate change projects and programs and oversees the implementation of the UNFCCC, the Kyoto Protocol and any related plans of action on the climate change front in Vanuatu. Though there are many members, in practice NACCC has been managed by two members of the Climate Change Unit of the Meteorology Department, which serves as the secretariat of NACCC.

The Vanuatu government authorized NACCC as Designated National Authority (DNA) for UNFCCC to approve and implement CDM projects in the country. However, UNFCCC does not accept DNA of Vanuatu since the approval process of CDM projects by DNA is not defined yet. According to NACCC, ADB will assist them to establish the approval process.

4.4.2 Donors and international organizations

(1) Forestry

In the forestry sector, AusAID supported the implementation of forest inventory (1989-1993) using aerial photographs taken in 1989 and prepared vegetation maps of major islands. AusAID also assisted the implementation of Vanuatu Sustainable Forest Utilization Project (1995-2000) to develop the Code of Logging Practices. Further, AusAID also assisted research on whitewood planting in Santo Island. Recently there is no project directly supporting the field operation. Instead, many projects have been implemented to support policy development on climate change issues and researches on AR-CDM, carbon credit, and REDD. Meanwhile, community-based forest protection and sustainable management projects are often categorized under biodiversity.

On-going or pipelined projects in the forestry sector of Vanuatu are shown below:

Project name	Brief contents of the project
Vanuatu Carbon Credit Project (VCCP)	◆ The Vanuatu Carbon Credits Project (VCCP) was initiated by Dr Sean Weaver of Victoria University of Wellington following a request in May 2006 by the UNFCCC SBSTA Chair. It was funded by UK Government Global Opportunity Fund, New Zealand Government and Victoria

Project name	Brief contents of the project
	<p>University. The counterpart agency in Vanuatu was NACCC. The project was divided into three phases as follow:</p> <ul style="list-style-type: none"> ◆ Phase 1 (2007): <ul style="list-style-type: none"> ➢ Project design ➢ Forest area change assessment (1990-2000-2005) by satellite data analysis ➢ International policy analysis and legal analysis ◆ Phase 2 (2008): <ul style="list-style-type: none"> ➢ Finalizing forest area change analysis ➢ Inventory of carbon stock ➢ Formulation of pilot projects ➢ Fund raising for implementing the pilot projects in phase 3 ◆ Phase 3 (2009) : <ul style="list-style-type: none"> ➢ Implementation of pilot projects (already secures US\$200,000 from FCPF for implementation)
Adaptation to Climate Change in the Pacific Region	<ul style="list-style-type: none"> ◆ It is a regional project being commenced by SPC in January 2009 with the fund from GTZ (4.2million Euro). The countries covered by the project include Vanuatu, Fiji and Tonga. It focuses on agriculture and forestry sectors and will be implemented until 2012. ◆ The project would include following activities though the details will be decided in the course of the initial project implementation: <ul style="list-style-type: none"> ➢ Preparation of strategy and guidelines for land use planning ➢ Establishment of database on climate change ➢ Selection and implementation of pilot projects (on agriculture and forestry) ➢ Awareness raising on climate change effects ➢ Policy development on land use, agriculture and forestry
National Adaptation Plan of Action (NAPA)	<ul style="list-style-type: none"> ◆ Prepared in 2007 for UNFCCC with the assistance of UNDP ◆ Sustainable forest management is one of the five priority projects selected in the NAPA paper. It would include activities on capacity building of key players of forestry sector, demonstration of adaptation measures in forestry sector, and compilation of lessons learned, constraints and success stories of adaptation measures. ◆ EU Global Climate Change Alliance (GCCA) and the World Bank will provide a total of US\$100,000 grant for preparation of the detail plan of the projects in 2009.
Sustainable Land Management (SLM) Project	<ul style="list-style-type: none"> ◆ UNDP implements the project for three years from 2009 using the fund from GEF. The project cost is US\$ 1.0 million. ◆ The project activities include awareness raising and capacity building on sustainable land use and compilation of GIS data on land use.

Forestry Act (2001) requires the Department of Forestry to formulate the Forestry Sector Plan for guiding forest development, protection and management in the country. The Department has

considered implementation of forestry inventory is necessary to update forestry data for preparation of the Forestry Sector Plan and requested FAO for assistance in 2005. But FAO does not reply to the request yet.

(2) Ecosystem conservation

Preparation of National Biodiversity Strategy and Action Plan, declaration of protected areas, and capacity building of the government staff and NGOs have been implemented for ecological conservation or biodiversity conservation mainly by the fund from GEF. On-going and pipelined projects in the sector are briefly explained below:

Project name	Brief contents of the project
Landholders Conservation Initiative Project	<ul style="list-style-type: none"> ◆ UNDP has implemented the project from 2005 to 2009 using GEF fund. The counterpart agency is the Environment Unit, Ministry of Land and Natural Resources. ◆ The project has implemented the activities in Santo, Gaua, and Tanna Islands. ◆ The main objectives of the project are (1) biodiversity conservation through strengthening and promotion of traditional conservation initiatives and (2) capacity building of the provincial staff on biodiversity conservation. ◆ Awareness raising on the importance of forest protection and biodiversity conservation is the main project activity. In addition, the project has provided support to the local communities in accordance with their needs: (1) income generation, (2) promotion of ecotourism, (3) checking the quality of drinking water, (4) development of environmental by-law of local environmental committee.
Forestry and Protected Area Management	<ul style="list-style-type: none"> ◆ It is a regional project of FAO funded by GEF and will be implemented in Vanuatu, Fiji, Samoa and Niue from 2009 to 2013. The total project cost is US\$16 millions. The counterpart agency in Vanuatu is the Environment Unit, Ministry of Land Natural Resources. ◆ The project in Vanuatu consists of five components. The project will be implemented in three sites: two sites in Pentecost Island and one site in Gaua Island. <ul style="list-style-type: none"> ➤ Review of existing regulations relevant to biodiversity conservation. ➤ Biodiversity baseline survey in existing protected area. ➤ Awareness raising and education to community leaders and schools. ➤ Financing mechanism for managing protected area. ➤ Income generation using biodiversity resources.

4.5 Needs assessment

4.5.1 Potential interventions required

The mission studied the needs of the country on climate change mitigation and adaptation by the interviews to the government agencies concerned such as the Department of Forestry, the Environment Unit and NACCC as well as through field reconnaissance. The results are summarized below. The brief features of the projects proposed by the mission are presented in Annex 3.2.

Opinions and needs of agencies concerned	Assessment and proposal by the mission
<p>【Department of Forestry】</p> <ul style="list-style-type: none"> ◆ Forestry Act (2001) requires the Department to formulate the Forestry Sector Plan, which shall be the basis of forest development, protection and management in the country. The Department needs assistance for the plan preparation as well as for updating of forestry data by implementing forest inventory. The Department requested FAO for assistance in 2005 but there is not response yet. 	<ul style="list-style-type: none"> ✓ Forest resources are an important source of income for the government and local people as well. Hence, it is necessary to grasp the present condition accurately and use it for planning of the forestry sector. ✓ It is likely FAO can not afford to assist this due to high cost. ✓ VCCP has conducted survey on change of forest cover using satellite data analysis but the project does not study the volume of forest resource ✓ <u>Propose to implement forest inventory and formulation of the Forestry Sector Plan (see Annex 3.2)</u>
<p>【Department of Forestry, Environment Unit】</p> <ul style="list-style-type: none"> ◆ Vanuatu is rich in biodiversity and it is an important resources for tourism. Hence, the needs to conserve biodiversity are very high. ◆ National Biodiversity Conservation Strategy was prepared in 1999 and provides necessary conservation activities. Many of which have not been implemented. Even if implemented, without expected outcomes. 	<ul style="list-style-type: none"> ✓ There are completed, on-going and pipelined projects with the main objectives of biodiversity conservation. But they were implemented only for three to five years and completed without concrete outcome> ✓ Awareness raising and tree planting as income generating activities take long time to achieve the objectives. Commitment for long-term assistance by donor is important. ✓ Though other donors implements similar projects, there are many places or sites where assistance is needed. Vanuatu government can not implement projects without donors' assistance. ✓ <u>Propose to implement a technical assistance project (see Annex 3.2)</u>
<p>【NACCC】</p> <ul style="list-style-type: none"> ◆ Want to request JICA to assist NACCC in preparation of the 2nd National Communication for UNFCCC. (This is not a request for forest ecosystem conservation but for climate change in general) 	<ul style="list-style-type: none"> ✓ The 1st National Communication was prepared with the assistance of SPREP. Shall be reconfirmed possible assistance of SPREP GEF, and UNDP. ✓ Possible to assist the preparation of the 2nd NC by dispatching experts.

It was often observed during the field reconnaissance the expansion of alien species, particularly species of vain in the roadsides and forests. Though the needs to exterminate the species were not confirmed at the agency concerned, it shall be controlled to prevent further spreading.

Table 4.1 Potential Interventions/Programs relating to “Conservation of Forest Ecosystems and Environmental Monitoring”

No.	Development Needs	Possible interventions	Type of Measures	Potential target sites	Applicable JICA's Schemes	Related Donors	Relevance to NAPA	Relevance to policies	Necessity	Urgency	Priority
1	Forest inventory and formulation of forestry sector plan	Forest inventory by the combination of the interpretation/analysis of high resolution satellite data and field survey Formulation of forestry sector plan	Mitigation / Adaptation	Major islands	Development study	Vanuatu Carbon Credit Project	High	High	High	High	High
2	Biodiversity Conservation through environmental education and income generation	Awareness raising on importance of forest/biodiversity and traditional conservation initiatives and environmental education Participatory land use planning and ecosystem survey Training on ecotourism development Fulfillment of community needs	Mitigation	Santo island or Ambae island (proposed)	T/A project combined with dispatch of JOCV	Forestry and protected Area Management	Medium	High	High	Medium - High	Medium - High
3	Assistance for preparation of 2 nd National Communication	Collection and review of data related to GHG emissions and removals Assessment of vulnerability to climate changes, financial sources for implementing mitigation and adaptation measures, transfer of technology, capacity development and awareness raising Preparation of report	-	-	Dispatch of expert	NIL	Medium	High	High	Medium	Medium

5. Samoa

5.1 General

5.1.1 Population and administrative situation

Samoa had a population of 176,710 in 2001 (2001 Census) with a natural growth rate between 1991 and 2001 of 0.87 % p.a. The following table shows the changes in population of the major places of the country.

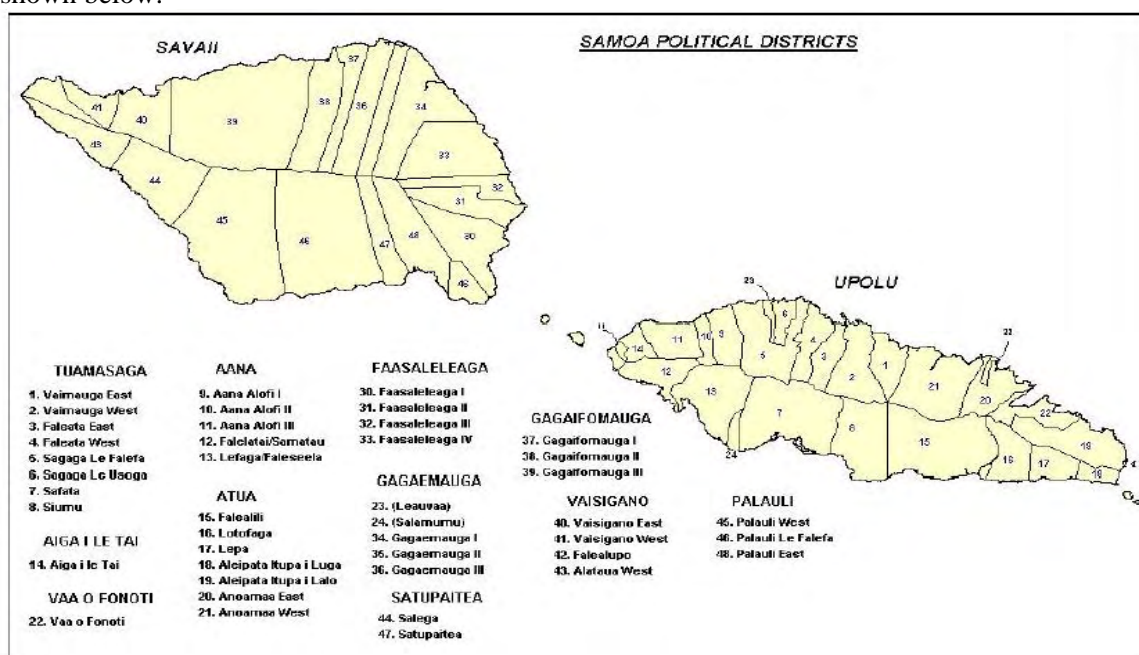
Population in Samoa (1991 and 2001)

Area	1991	2001
Apia (Urban area)	35,489	38,557
North West Upolu	39,046	52,481
Rest of Upolu	41,713	41,345
Savai	45,048	41,826
Total	161,296	174,140

Source: Population Census Report 2001

The most significant population increase had taken place in the North-West Upolu Area as shown in the table above. It was reported that about 52 % of residents reside in the North-West Upolu Area together with Apia Urban Area. (Samoa Country Environmental Profile, 2006).

There are over 330 villages in the country. They are administratively grouped into 48 districts as shown below.



Source: Technical Service Division, MNREM.

District Map of Samoa

5.1.2 Land tenure / land ownership status

Samoa has three main types of land ownership, namely customary ownership (so-called customary land), freehold ownership (freehold land), and government-owned land. Customary lands are managed by “matai”, a head of an extended family or kinship group, called “aiga.” Matai has customarily and traditionally functioned as a trustee responsible for management and allocation of the

customary land for various uses by his family members. Freehold lands are estates owned by private owners, while the government-owned lands are regarded as public lands including those owned by state companies and classified as national parks and reserves. The following table shows the land tenure situation in the country.

Land Tenure Situation in Samoa

Type	Upolu (ha)	Savaii (ha)	Total	
			(ha)	(%)
Customary	76,166	153,490	229,656	81
Government (Including STEC & SLC)	29,257	15,102	44,359	16
Freehold	7,800	1,037	8,837	3
Total	113,223	169,629	282,852	100

Source: Land Management Division, MNRE

5.2 Present conditions of forest ecosystems

5.2.1 Land use and forest cover

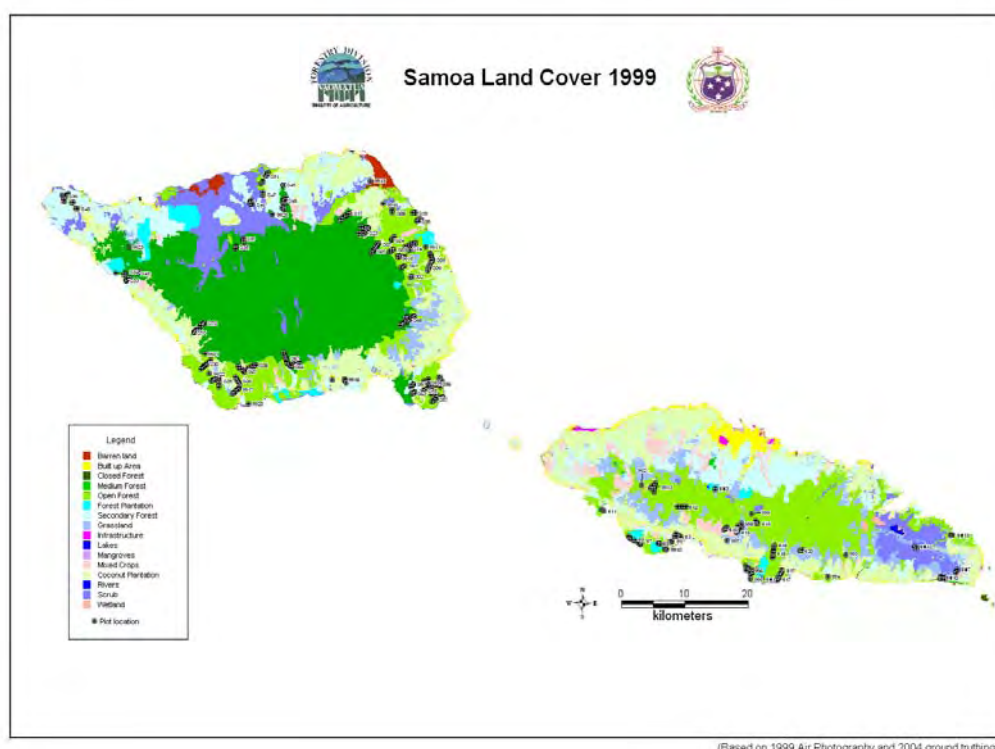
The land use in the country based on the interpretation of aerial photographs taken in 1999 and ground truth carried out in 2004 is shown below.

Land Use in Samoa (2004)

Land Use	Area (ha) in 2003 <1
Forest	170,265
Mangrove	370
Scrubs and grassland	39,608
Mixed crops	10,228
Plantation	53,110
Barren land	2,005
Water bodies	1,028
Infrastructure and residential	7,561
Total	284,176

Note: Data was based on 1999 aerial photographs and ground truth in 2004

Source: Forestry Division (2004)



Source: Forestry Division, MNREM.

Land Use Map in Samoa (2004)

Since 2003, FD has just updated the forest coverage in the country based on the results of monitoring reports prepared by its regional offices. The latest data of forest coverage in the country are show below.

Forest Types in 2008

Forest type	Area (ha) in 2008
Cloud Forest	82
Medium Forest	61,059
Open Forest	51,884
Secondary Forest	37,181
National parks	18,721
Total	168,927

Source: Forestry Division (2009)

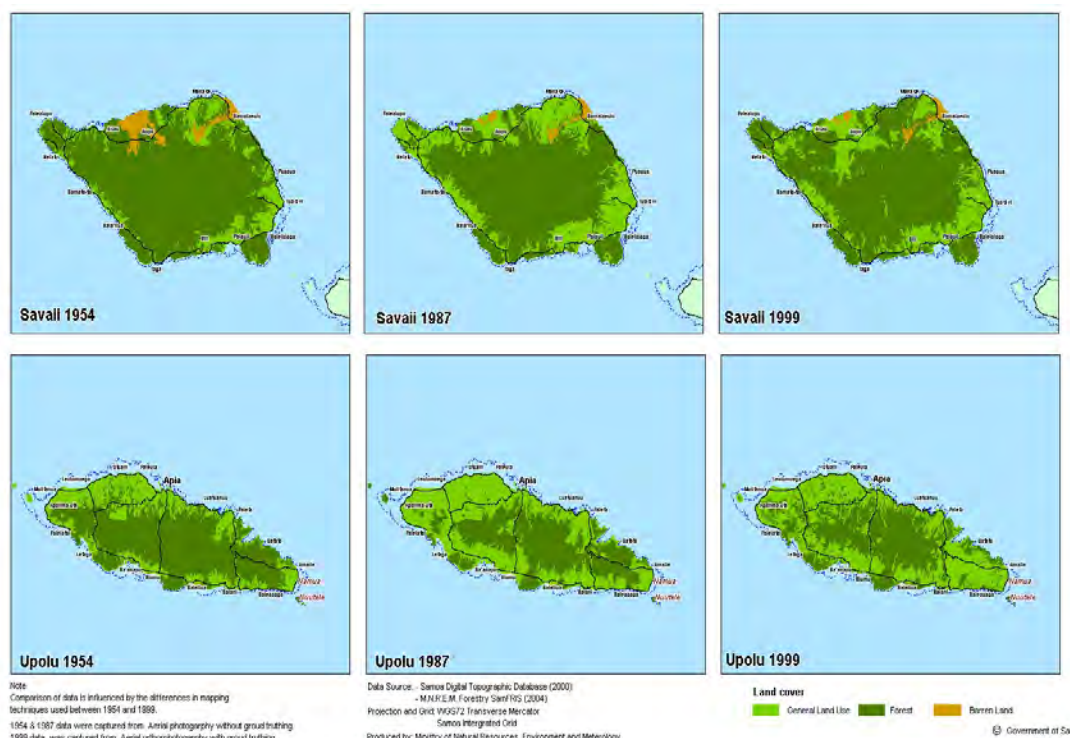
However, any divisions have never monitored the forest conditions by using spatial data, such as satellite images, since 2003. Furthermore, there is no monitoring work done for mangrove forests. It is desirable that the forest resource map be periodically updated by using the latest spatial data/information, so that the government could manage the forest resources and ecosystems effectively and wisely.

It is reported that forests in the country had been cleared between 1950's and 1990's due to extensive commercial logging. The following table and drawings show the changes of the proportion of forested areas in the country over the period 1954 to 1999.

Changes in Forest Coverage in Samoa for the 30 Years

Year	Upolu	Savai	Total
1954 <1	65 %	79 %	74 %
1987 <2	43 %	63 %	55 %
1999 <3	46 %	69 %	60 %

Sources: <1 Fox and Cumberland 1962
 <2 ANZDEC 1990
 <3 Atherton 2004



Data Source: Samoa Digital Topographic Database (2000)/ MNREM Forestry SamFRIS (2004)

Changes in Forest Coverage in Samoa for the 30 Years

As the above-mentioned table and figures reveal, it is considered that the extensive deforestation took place over 30 years by the beginning of 1990s when the Government banned the export of log. Although the deforestation has been reduced, it is also reported that the quality of forest has continuously degraded due to agricultural activities and strong cyclones. The proportion of open and secondary forests has increased in the total forested areas, while the area under medium forest has decreased instead. In addition, intrusion of invasive species in open or secondary forest has often hindered the degraded forest from recovering, and moreover, it has accelerated the forest degradation in many cases. This indicates that the natural forest ecosystem is highly vulnerable to the intrusion of invasive species, once the forest structure is disturbed and its canopy is opened up by either cyclones or any man-made causes. It is, therefore, important to prevent further forest degradation for forest ecosystem conservation in the country.

5.2.2 Protected areas and forest ecosystems

The protected area management system has recently begun to be put into practice in the South Pacific region. In 1978, with the establishment of O Le Pupu Pue National Park, Samoa became the first

Pacific Island nation to create a National Park. At present, there are five National Parks and 18 National Reserves in the country as tabulated below. In addition to the protected areas proclaimed by the government, four community conservation areas have been established by the initiative of the international organizations. Figure 5.1 shows the major protected areas in the country. These protected areas are considered important habitats of biodiversity resources in terrestrial areas of the country.

Existing Protected Areas in Samoa (as of 2008)

Type of PA	Name of site	Area
National Park	O le Pupu Pue NP	4,230
	Asau-Falelima NP	1,888
	Lata NP	3,732
	Mauga Salafai NP	5,974
	Lake Latoto NP	470
National Reserves	Mt. Vaea Researve	89
Community Conservation Areas	Falealupo CA	722
	Uafato CA	1,161
	Saanapu Sataoa CA	52
	Laulli CA	400

There is a need to make more effort to achieve one of the target of National Biodiversity Strategy and Action Plan (2001), which is “to increase coverage of protected areas to 15 % (or about 42,600 ha) of the total land to conserve full representatives of Samoan ecosystems”.

Many reports say that the biodiversity of Samoa is particularly important.¹ A review of the conservation value of a total of 226 southern pacific islands ranked three islands of Samoa as 23rd for Savaii, 30th for Aleipatam and 46th for Upolu². The flora in the country is one of the most diverse in Polynesia with about 25 % of the plants are endemic to Samoa and about 30% are endemic to the Samoan archipelago. A survey made in 1992³ classified Samoa’s vegetation into 19 plant communities with five broad categories as shown below.

Major Forest Ecosystems in Samoa

Categories of Flora	Plant communities
Littoral vegetation	Four communities of vegetation situated on the seashore were recognized, herbaceous strand or beach, littoral shrubland; <i>Pandanus</i> scrub; and littoral forest where much of these types have been lost or degraded. The best remaining examples are at Aleipata Islands, O Le Pupu-Pue and sites on the south (central) coast of Savaii.
Wetland vegetation:	Four communities were recognized: coastal marsh, montane marsh, mangrove scrub/forest and swamp forest. There have been very serious losses of wetlands, particularly in the lowlands, and only a few intact areas of each type remain.
Rainforest	Four communities were recognized on an altitudinal gradient: coastal, lowland, mountain (montane?) and cloud forest (restricted to Savaii). The mountain forest is considered as habitats for the richest flora of any forest community in the country. In Upolu, there is no mountain forest were found, while a certain area of forest still remain in Savai, especially in the higher elevations where there is little human activities.
Volcanic vegetation	Two communities, lowland volcanic scrub and upland volcanic scrub, were recognized. These are found only on recent lava flows in Savaii.
Disturbed vegetation	Four communities derived from a combination of human activities and weather were

¹ Samoa Country Environmental Profile (2006), State of Environment (2006), etc.

² Dahl, 1986

³ Whistler, 1992.

Categories of Flora	Plant communities
	recognized, namely, managed land, secondary scrub, secondary forest and fernlands.

Source: State of Environment (2006)

The forests are important habitats for many critical species of fauna in Samoa. Though the country is well known for the rich and diversified fauna, there are few data and information showing the situation of fauna in the country. The State of Environment Report (2006) gives some insights of the fauna in the country.

Fauna in Samoa

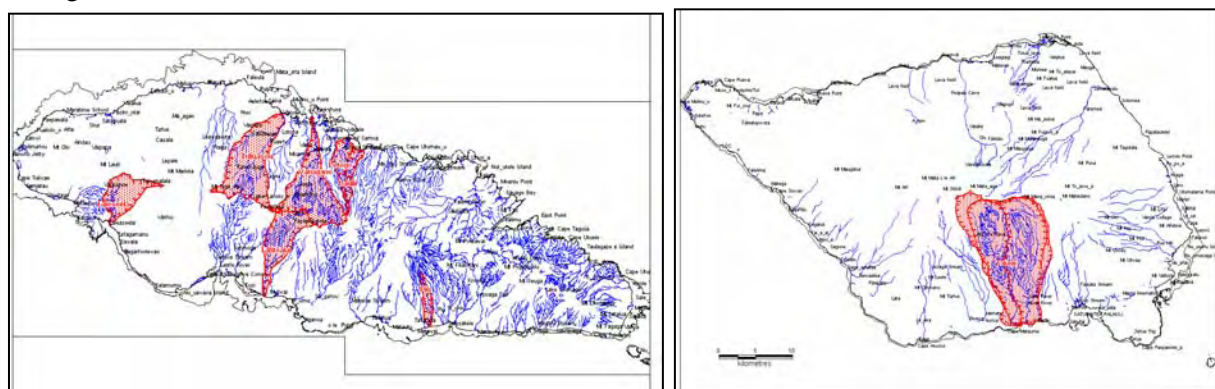
Type of fauna	Characteristics
Terrestrial	There are 13 species of terrestrial mammal present in Samoa and of these only three are native, namely, Samoan Flying-fox (<i>Pteropus s. samoensis</i>), Tongan or White-necked Flying-fox (<i>P.tonganus</i>), and a small insectivorous bat, Sheath-tailed Bat (<i>Emballonura semicaudata</i>). The flying foxes are important for the long-term survival of the forests as they pollinate the flowers of many species and disperse seeds of the fruits they eat through the forest.
Birds	Thirty-five species of land birds and 21 sea and shore birds have been recorded in Samoa. Eight of the land birds are endemic (there are an additional six endemic sub-species) while four species have been introduced. One native species 'puna'e', Samoan Wood Rail (<i>Pareudiastes pacificus</i>) is probably extinct though a population may persist on upland Savaii.
Reptiles	Fourteen species of lizards and one snake (<i>Pacific Boa Candola bibroni</i>) have been recorded in Samoa. Most of the lizards appear fairly abundant and only one (Samoan Skink <i>Emoia samoensis</i>) is endemic to the Samoan Archipelago (GoS 1998).

State of Environment (2006)

5.2.3 Catchments areas and mangrove forests

The major water catchments in Upolu are the Fuluasou, Vaisigano, Namo, Mulivai, Salani, Tafitoala, Nuusuatia, Leafe or Lotofaga and Faleseela Rivers and in Savaii are the Sili (or Vaiola), Palauli (or Faleata) Rivers and the upper reaches of the Maliolio River (RKL/GMA Ltd 1995). Recently, the Government designated the following eight river catchments as priority watersheds. Water in those watersheds are being used for domestic and industrial purposes and/or hydropower electric generation.

- a. Vailoa catchment (Upolu) , b. Saleseu catchment (Upolu)
- c. Faleseela catchment (Upolu) , d. Fuluasou catchment (Upolu)
- e. Vaisigano catchment (Upolu), f. Letogo catchment (Upolu)
- g. Gataivai catchment (Savaii), h. Vaimate catchment (Savaii)



Designated Critical Watersheds in the Country

Though they are classified as critical watersheds by the Government, most of the lands are still under customary ownership. Hence, there is a need to develop a mechanism to manage and conserve the watersheds in a collaborative manner between the Government and local communities.

In Samoa, mangrove forests have been disregarded and degraded by firewood collection and inappropriate land development especially around Apia and Vaiusu Bay, despite its environmental value. In addition, alteration of river courses, in-filled lagoons, dumping of rubbish and industrial wastes, and the discharge of raw sewage into mangrove ecosystems have exacerbated the problem. At present, there is no clear data except the land use map prepared in 2004 showing the areas and conditions of mangrove forests in the country. The common mangrove species found in Samoa are *Rhizophora mangle (samoensis)* (Red mangrove) and *Bruguiera gymnorrhiza* (Oriental mangrove).

5.2.4 Major threats to forest ecosystems

Commercial logging for export and the succeeding farming used to be the major causes of deforestation in the country. However, the rate of deforestation declined in the beginning of 1990s when the Government banned the export of log. At present, it is considered that the direct threats to forest ecosystems are: i) farming activities including cattle farming, ii) disturbance caused by strong typhoons/cyclones, iii) forest fires, and iv) infrastructure development. In addition, the intrusion of invasive species after the disturbance of forest has also hindered the forest ecosystems from recovering. Moreover, one of the invasive species coils up and covers a standing trees and end up killing the parasitized tree. Control of the invasive species is also one of the current issues to tackle for conservation of forest ecosystems in Samoa.

5.3 Relevant policies and regulations

5.3.1 Laws and regulations relating to the forest and biodiversity conservation

The following acts and government regulations relevant to forest and biodiversity conservation in the county were reviewed in the field work.

- a. Forests Act 1967
- b. National Parks and Reserves Act 1974
- c. Lands, Surveys and Environment Act 1989
- d. Forest Management Bill 2007
- e. Water Resources Management Act 2008

The following table shows the relevance of the above-mentioned legislative documents to climate change and/or forest ecosystem conservation.

Reviews of the Existing Acts and Bills relevant to Forest Ecosystem Conservation

Acts/Regulations	Summary or Relevance to climate changes
Forests Act 1967	Focus is put more on issuance of licenses/leases and recovery of rents and royalties. There is no description of sustainable forest management such as obligation of submission of an operation plan or conformity with the code of practices.
National Parks and Reserves Act 1974	This act gives provisions in relation to national parks, reserves and other places to be conserved for national or historical interest. The act allows the Government to declare the public lands as either national parks or other reserves (nature reserves, recreation reserves, and historic reserves).

Acts/Regulations	Summary or Relevance to climate changes
Lands, Surveys and Environment Act 1989	The act is the principal law relating to administration of land matters in Samoa and to management and protection of the environment of the country. Part VIII of the act gives detailed provisions concerning conservation and protection of the environment, such as organizational set-up for protection of environment in the Government, functions and powers of the organizations and appointed persons for environmental conservation, and activities to be regulated under the act.
Forest Management Act 2007 (or still Bill ?)	The new act shows the drastic change of the government stance on forest management from “production” to “conservation or sustainable management”. The act requires the acquisition of license, compliance with the code of practice in logging, and preparation/submission of an operation plan prior to the operations. The act defines and promotes farm forestry and agroforestry (Articles 49-51). The act also allows the government to declare any land of any class to be protected land for a period not exceeding five years (Article 58). In case the land for protected area is not the public land, a/ land owner/s will be entitled to compensation (Article 61).
Water Resources Management Act 2008	The act clearly states that the Government shall protect and conserve critical watersheds with preparation of a watershed management plan. Hence, the formulation of watershed management plans of the designated watersheds is now one of the priority works to be fulfilled by WRD of MNRE.

5.3.2 Policy and strategies relating to forest and biodiversity conservation

The following policies and strategies relevant to the target sectors were reviewed during the field survey.

- a. National policy on forestry for sustainable development (2007)
- b. National policy on conservation of biological diversity (2007)
- c. National policy on combating climate change (2007)
- d. National water resources management strategy (2007-2017)
- e. National Greenhouse Gas Abatement Strategy (2008-2018)

Some findings gained through reviews of the policies and strategies listed above are highlighted below.

Review of the Existing Policies and Strategies relevant to Forest Ecosystem Conservation

Acts/Regulations	Relevance to climate changes / forest ecosystem conservation
National policy on forestry for sustainable development (2007)	The focus of the policy is put on sustainable management of forest resources in the country setting five key objectives, namely, i) to promote the sustainable development of Samoa’s forests in partnership with all stakeholders, ii) to protect, conserve and rehabilitate forests, iii) to establish and maintain commercial plantations (at least 4,000 ha) and farm forests, iv) to expand the capacity for production of value added timber products, and v) to ensure sustainable forest management and forest sector development. It is worth noting that the community-based management is one of the guiding principles.
National policy on conservation of biological diversity (2007)	Likewise, this policy states in its vision that “Samoa’s biodiversity resources are protected, conserved and sustainably managed so that they will continue to flourish and regenerate to support better livelihoods for all stakeholders.” “Sustainable use of biological resources” and “Community participation/consultation” are core guiding principles. The key objectives set in the policy are: i) public awareness and education, ii) capacity development, iii) conservation of biological diversity, and iv) sustainable use of biological resources.
National policy on	Promotion of clean development mechanism and implementation of forestry-related

Acts/Regulations	Relevance to climate changes / forest ecosystem conservation
combating climate change (2007)	mitigation measures are part of the strategies under the policy. On the other hand, implementation of NAPA is the major action to be taken as adaptation measures against climate changes.
National water resources management strategy (2007-2017)	One of the areas emphasized by the policy is the management of watersheds/water catchments, since it is indispensable for sustainable water resources management. Hence, development of watershed management plans of the priority watersheds is also listed as an action to be taken for “development and strengthening of existing measures and mechanisms to protect the quality and sources of freshwater (Objective 3)” in the policy.
National Greenhouse Gas Abatement Strategy (2008-2018)	One of the objectives in the strategy is to reduce GHG emissions by i) reduction of deforestation and degradation of existing native forests, ii) reforestation, protection and expansion of mangrove forests, and iii) promotion of CDM projects.

5.3.3 National Adaptation Program of Action (NAPA)

The National Adaptation Program of Action (NAPA) is the main guiding document to identify the priority interventions relating to adaptation measures against climate changes. A total of nine priority projects are proposed in NAPA.

Review of the National Adaptation Program of Action (NAPA)

Priority	Sector	Project profile
1	Water	Securing community water resources
2	Forestry	Reforestation, rehabilitation and community forest fire prevention program
3	Health	Climate health program
4	Climate Services	Climate early warning system
5	Agriculture	Agriculture and food security sustainability
6	Land use planning	Zoning and strategic management planning
7	Coastal areas	Implementing coastal infrastructure management plans for highly vulnerable districts
8	Biodiversity	Establishing conservation program in highly vulnerable biodiversity areas in communities
9	Tourism	Sustainable tourism adaptation program

Based on the above-mentioned priority projects, the GoS proposed the following five projects for implementation.

Proposed Projects by the Government of Samoa

No.	Related Sector	Project Components	Funding sources
1	Climate Health Agriculture	Early warning system Climate health program Sustainable agriculture and food security	GEF/UNDP
2	Climate Coastal	Early warning system Coastal protection	GEF/PACC
3	Climate Biodiversity Coastal	Early warning system Marine biodiversity conservation (MPAs) Coastal wetland rehabilitation	GEF/UNDP
4	Climate Land use planning Water Forestry Tourism	Early warning system Zoning and strategic management planning Surface flood mitigation Forest fire prevention Sustainable tourism adaptation	AusAID (under discussion)
5	Climate	Early warning system	None

No.	Related Sector	Project Components	Funding sources
	Biodiversity Forestry Water	Terrestrial biodiversity conservation (PAs on public lands) Reforestation and rehabilitation Protection of water resources	

Accordingly, the projects from No. 1 to 3 have secured funding sources, while No. 4 is currently under discussion with AusAID for assistance. There is no definite financial source defined for No 5 project. Since all the proposed projects have yet to be commenced, there is no feedback or lessons obtained through the project implementation.

5.4 Stakeholder analysis

5.4.1 Government organizations related to the sectors

The Ministry of Natural Resources and Environment will be the main implementing agency for mitigation and adaptation measures concerned with forest ecosystem conservation. There are 11 divisions under the Chief Executive Officer of the Ministry as shown below. The following table shows the main objectives of and human resources in the divisions of MNRE.

Main Objectives of and Human Resources in the Divisions of MNRE

Division	Main objectives of the divisions and relevant sections under the divisions
Land Management	<u>Main Objective</u> To facilitate and implement sustainable land management practices and administration of land and land-based resources <u>Sections and human resources:</u> Five sections: Land Registration, Land Administration, Land Development, Land Valuation and Land Commission Staffing in 2007: 25 persons (4 principal officers, 5 senior officers, 7 officers, and 9 others)
Environment and Conservation	<u>Main Objective:</u> To formulate and implement sustainable development and management of biological resources and the environment <u>Sections and human resources:</u> Four sections: Conservation of terrestrial biodiversity, Conservation of marine biodiversity, National parks and reserves, and Waste management Staffing in 2007: 17 persons (4 principal officers, 4 senior officers, 9 officers, and 0 others)
Forest Services	<u>Main Objective:</u> To ensure sustainable development and management of forest resources <u>Sections and human resources:</u> Four sections: Forest management in Upol, Forest Management in Savai, Research and development, and Planning and policy Staffing in 2007: 181 persons (3 principal officers, 5 senior officers, 18 officers, and 155 others)
Technical Services	<u>Main Objective:</u> To provide technical services to support the sustainable development of natural resources and environment <u>Sections and human resources:</u> Three sections: Surveying, Quality assurance, and National mapping Staffing in 2007: 19 persons (2 principal officers, 2 senior officers, 5 officers, and 10 others)
Meteorological and Geo-science Services	<u>Main Objective:</u> To provide meteorological and geoscience services in support of sustainable development of natural resources <u>Sections and human resources:</u>

Division	Main objectives of the divisions and relevant sections under the divisions
	Five sections: Weather services, Climate services, Geo-scientific services, Disaster management, and Climate change Staffing in 2007: 39 persons (6 principal officers, 5 senior officers, 6 officers, and 22 others)
Planning & Urban Management Services	<u>Main Objective:</u> To manage sustainable planning and development through the implementation of the Planning and Urban Management Act <u>Sections and human resources:</u> Three sections: Strategic planning, Sustainable development, and Urban management Staffing in 2007: 17 persons (3 principal officer, 3 senior officers, 7 officers, and 4 others)
Water Resources Services	<u>Main Objective:</u> To formulate and implement sustainable water resource management <u>Sections and human resources:</u> Three sections: Regulatory and policy, Hydrology, and Watershed Staffing in 2007: 31 persons (3 principal officers, 3 senior officers, 2 officers, and 23 others)
Legal Services	<u>Main Objective:</u> To provide sound and timely legal services for the Ministry to support the sustainable development of natural resources and environment <u>Sections and human resources:</u> Four sections: Environmental conventions, Legal advice, Contracts, and Courts Staffing in 2007: 1 person (1 principal officer)
Corporate Services	<u>Main Objective:</u> To provide efficient HRM, financial services and effective capacity building and public awareness to support sustainable development of natural resources and environment <u>Sections and human resources:</u> Four sections: Administration, Finance, Capacity building and HRD, Operations and maintenance Staffing in 2007: 46 persons (3 principal officers, 8 senior officers, 9 officers, and 26 others)
Global Environment Facility Services	<u>Main Objective:</u> To assist with finalizing Samoa's priority for environmental protection and restoration through the GEF-Pacific Alliance of Sustainable Framework <u>Sections and human resources:</u> Three sections: Planning, Implementation, and Public awareness Staffing: GEF Consultant
Renewable Energy	<u>Main Objective:</u> To provide best services to promote climate change mitigation through energy efficiency and renewable energy for sustainable development of natural resources and environment <u>Sections and human resources:</u> Three sections: Energy efficiency, Renewables, and Public awareness Staffing: 1 staff (1 ACEO)
Information and Communication Technology	<u>Main Objective:</u> To provide best services to promote effective and efficient information, communications, and technology to support the sustainable development and management of the country's natural resources and environment <u>Sections and human resources:</u> Staffing in 2007: 6 persons (1 principal officers, 1 senior officers, 3 officers, and 1 others)

Source: MNRE Corporate Plan (2008-2011) and MNRE Annual Report (2006-2007)

Among other, the following divisions will be involved in the implementation of mitigation and adaptation measures related to the conservation of forest ecosystems and environmental monitoring.

Major Divisions relevant to Mitigation and Adaptation Measures

Division	Relation to mitigation and adaptation measures against climate change
Environment and Conservation	Conservation of terrestrial biodiversity Conservation of mangrove forest Conservation of national reserves
Forest Service	Sustainable management of forest Conservation of national parks
Water Resources	Protection and sustainable management of watersheds
Land Management	Sustainable land management
Technical Service	Periodical monitoring of forest and land use changes in the country

5.4.2 Donors and international organizations

Through the discussions with the divisions of MNREM and other relevant organizations, it was found that the government has had technical and financial assistance from several donors and international/regional organizations in the fields of forest and biodiversity conservation. Some of the on-going programs/projects being implemented in the said fields are listed below.

- a. Sustainable Land Management Program (GEF/UNDP)
- b. Island Ecosystems Programs (SPREP)
- c. Community-based Adaptation Program (UNDP)
- d. The Project for Enhancing Management Capacity for National Parks and National Reserves of Samoa (JICA)
- e. Integrated Project called “NAPA 2” (GEF)
- f. Forest Conservation Program (GEF/FAO) (under planning)
- g. Community Forest Program (FAO/AusAID) (under planning)
- h. Community conservation areas (SPREP / Conservation International)
- i. Ecosystem Hotspot (Conservation International)
- j. Apia watershed conservation project (still proposal to EU/GEF??)

5.5 Needs assessment

5.5.1 Policy direction in relation to combating climate changes

The Study Team analyzed the current government policies and identified key strategies relating to mitigation and adaptation measures in the fields of conservation of forest ecosystems and environmental monitoring.

Assessment of the Existing Government Policies and Strategies

Sector	Policy direction	Key strategies relating to measures against climate changes	Actions to be taken
Forestry	Community participation	<u>Sustainable forest management in a participatory manner</u> , such as: a. Conservation of forest resources and ecosystems (including REDD) in customary lands; and b. Rehabilitation of degraded forests on communities’ initiatives (including AR-CDM) in customary lands.	a. Introduction of community-based forest management and capacity development b. Introduction of CDM/REDD c. Establishment of a forest monitoring system with capacity development

Sector	Policy direction	Key strategies relating to measures against climate changes	Actions to be taken
			d. Coordination with local partners to co-work with local communities
	Forest conservation	<u>Conservation of existing forests (including mangrove) and rehabilitation of degraded forests</u> through: <ol style="list-style-type: none"> a. Establishment and management of protected areas (national parks and reserves); b. Natural forest restoration of degraded and merremia-covered lowland forests; c. Protection of the designated watersheds; d. Strengthening of the function of SamFRIS and use the database for planning of sustainable forest management of the country; e. Involvement of local communities in sustainable forest management planning; and f. Introduction of income generating activities, such as improvement of farm produce, introduction of community-based eco-tourism, and other livelihood options. 	<ol style="list-style-type: none"> a. Preparation of management plans of the protected areas b. Identification of potential areas for protected areas c. Public awareness campaign about invasive species d. Introduction of community-based forest rehabilitation and/or community-based integrated watershed management in customary lands e. Upgrading of SamFRIS and capacity development of the staff so as to periodically update forest monitoring data f. Coordination with other relevant sectors / divisions (formation of an interdisciplinary task force especially for watershed management)
	Plantation and farm forestry	<u>Afforestation</u> through: <ol style="list-style-type: none"> a. Introduction of agroforestry system; b. Assistance in afforestation by provision of seedlings of high value trees; and c. Introduction of fruit trees and other cash crops together with tree species. 	<ol style="list-style-type: none"> a. Introduction of agroforestry / sustainable land management practices b. Introduction of cash crops and fruit trees c. Introduction of high value tree species
	Industry development	Reduction of the volume of logging through; <ol style="list-style-type: none"> a. Improvement of a grading system of timber; and c. Improvement of timber processing to add more values to forest products 	<ol style="list-style-type: none"> a. Introduction and development of a new regulations for grading b. Improvement of timber processing techniques or Introduction of new techniques
	Forest administration	<u>Capacity development of the forestry sector</u> to achieve sustainable forest management through: <ol style="list-style-type: none"> a. Capacity development in the fields related to the above-mentioned activities; b. Development and incorporation of fire protection guidelines into forest management; and c. Security of budget allocation 	<ol style="list-style-type: none"> a. Capacity development of the staff and organizations b. Development of guidelines b. Coordination with external support agencies
Biodiversity	Public awareness and education	Reduction of any threats to biodiversity through public awareness and environmental education activities	<ol style="list-style-type: none"> a. Conduct of public awareness campaign / environmental education activities b. Preparation of campaign/education materials
	Capacity building	<u>Conservation of ecosystems and</u>	a. Training of staff

Sector	Policy direction	Key strategies relating to measures against climate changes	Actions to be taken
		<u>biodiversity through:</u> a. Establishment / Upgrading of baseline data of terrestrial ecosystems and biological resources; b. Development of a system to monitor and assess the biodiversity; and c. Development of capacities of MNRE.	b. Conduct of inventory surveys c. Development of a monitoring system d. Establishment of database e. Capacity development of staff
	Conservation of biological diversity and genetic resources	<u>Conservation of biodiversity in collaboration with local communities,</u> such as: a. Establishment of community conservation area; b. Introduction of community-based ecotourism or any other scheme to generate income from resources / biodiversity to be conserved; c. Establishment of a co-management or co-monitoring system of biodiversity with local communities; and c. Development of a program for monitoring any impacts on biodiversity from climate changes.	a. Introduction of community-based ecosystem conservation / management b. Introduction of community-based ecotourism c. Development of a template of bylaws / village regulations on biodiversity conservation e. Development of a field monitoring system / mechanism in a participatory manner f. Integration of the field monitoring results with spatial information g. Capacity development of the staff on the above-mentioned aspects
Watershed management	Sustainable management of surface and ground water	<u>Sustainable watershed management</u> through: a. Development of an integrated watershed management in a participatory manner; b. Involvement of local communities in management activities; c. Promotion of proper land use practices; and d. Conservation of critical catchment and rehabilitation of degraded lands.	a. Preparation of land use planning/zoning of the priority critical watersheds b. Application of participatory planning approach c. Collection and analysis of baseline data of the priority watersheds (e.g., present land use, soils, slopes, vegetation covers, and socio economic conditions) d. Introduction of community-based forest / resource management concepts;
NAPA	Biodiversity Forestry Water	<u>Terrestrial biodiversity conservation (PAs on public lands)</u> <u>Reforestation and rehabilitation</u> <u>Protection of water resources</u>	a. Conservation of national parks or nature reserves b. Rehabilitation / restoration of degraded land c. Watershed conservation

5.5.2 Activities done by the government and donors/international organizations

(1) Actions taken by the Government

In relation to the above mentioned directions, MNRE has taken the following actions so far.

Assessment of the Past and On-going Activities by the Government

Sector	Major activities	Contribution to the key strategies	Remarks
Forestry	Plantation on state forest land	Rehabilitation of degraded government land	Less than 100 ha/year
	Community forestry program	Afforestation in customary lands	About 200 HHs
	Pilot activity to control invasive species	Restoration of degraded areas	One national park
	Conduct of baseline surveys in the national park to develop a management plan	Management of protected areas	One national park
	Enactment of Forest Management Act	Legalization of sustainable forest management	-
Biodiversity Conservation	Establishment of two MPAs in collaboration with local communities	Conservation and rehabilitation of mangrove	22 villages involved
	Resource inventories of a certain species in the national parks	Conservation of biodiversity and management of protected areas	-
Watershed	Enactment of Water Resource Management Act	Legalization of watershed management	-
	Identification of the priority watersheds	Sustainable watershed management	Eight priority watershed identified

(2) Actions taken by Donors and International Organizations

On the other hand, the following table shows interventions/programs that have been introduced or are expected to be introduced by donors and international organizations.

Assessment of the Past and On-going Activities done by Donors and International Organizations

Projects / Programs	Activities related to climate changes	Remarks
Sustainable Land Management Program	Rehabilitation of a degraded water catchment	Pilot project at one village
Community-based Adaptation Program	Establishment of community conservation area	Worked with one village
The Project for Enhancing Management Capacity for National Parks and National Reserves of Samoa	Control of invasive species Preparation of management plans of NP and NR	Pilot project-based
Community Forest Program <1	Introduction of agroforestry practices in buffer zone	????
Forest Conservation Program <1	Introduction of community-based protected area management concept Land use planning	Targeting four villages in Savai
Apia watershed conservation project <1	Development of a watershed management plan with a land use plan	Two critical watersheds in Upolu But there is no clear description about community involvement in planning

Note: <1 The project is still in the planning stage.

Although the Government as well as donors and international organizations have already carried out several interventions/programs relating to mitigation and adaptation measures, many of them are at

small scale or pilot project level. Furthermore, some of them are still new to the country and may need more time and support for the Government to implement them on its own initiative.

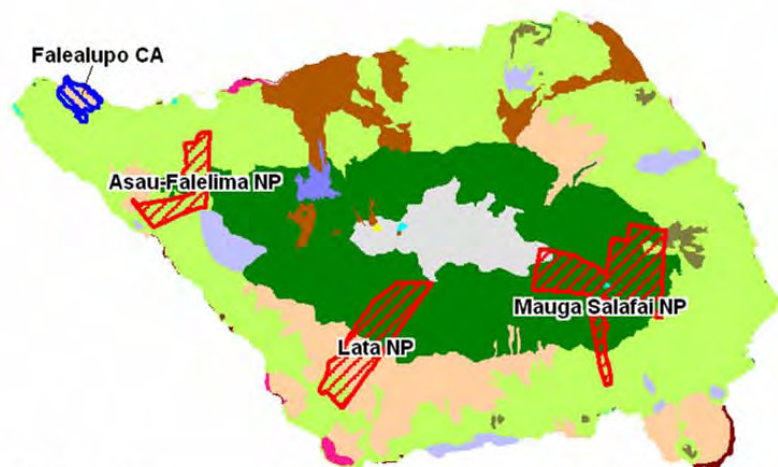
5.5.3 Potential Interventions required

Based on the information given above, the potential mitigation and adaptation measures relating to conservation of forest ecosystems and environmental monitoring were identified as shown in **Table**

5.1. In identification of the development needs, the following aspects were taken into account.

- Potential activities should be in line with the government policies and strategies including NAPA;
- A majority of forests and terrestrial ecosystems are located in customary lands; the community participation should be a key to conservation of forest ecosystems; and
- Lack of baseline or basic data is one of the critical issues for the Government to develop a proper plan and monitor any mitigation and adaptation measures against climate change.

Samoa National Parks, Reserves, MPAs and Community Conservation Areas



Name_of_site	Conservation_Type	Area_Ha
Falealupo CA	Community Conservation Area	722.166
Uafato CA	Community Conservation Area	1,161.37
O le Pupu Pue NP	National Park/Reserve	4,230.62
Mt Vaea Reserve	National Park/Reserve	89.1303
Saanapu-Sataoa CA	Community Conservation Area	52.8378
Asau-Falelima NP	National Park/Reserve	1,887.61
Lata NP	National Park/Reserve	3,731.98
Mauga Salafai NP	National Park/Reserve	5,973.59
Lake Lanotoo NP	National Park/Reserve	469.952
Forestry Site	National Park/Reserve	768.64
Laulii CA	Community Conservation Area	400
Proposed extension to NP	National Park/Reserve	10,000

Name_of_site	Conservation_Type	Area_Ha
Aleipata MPA	Marine Protected Area	4,255
Safata MPA	Marine Protected Area	1,845
Palolo Deep Marine Reserve	Marine Protected Area	22

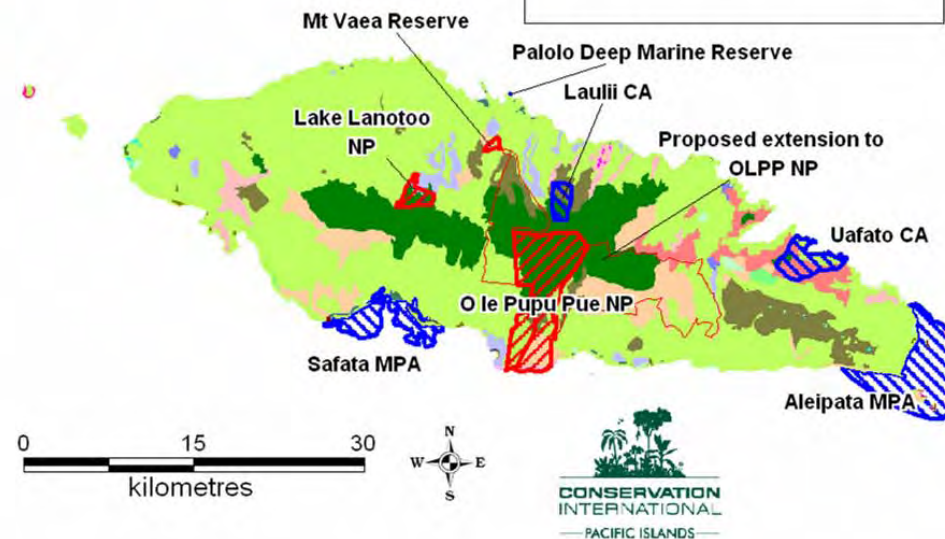


Figure 5.1 National Parks and Other Major Protected Areas in Samoa

Table 5.1 Potential Interventions/Programs relating to “Conservation of Forest Ecosystems and Environmental Monitoring”

No.	Development Needs	Possible interventions	Type of Measures	Potential target sites	Applicable JICA's Schemes	Related Donors	Relevance to NAPA	Relevance to polices	Necessity	Urgency	Priority
1	Conservation of Forests in customary lands	Community-based forest management with rehabilitation of degraded land and introduction of agroforestry in customary lands of several villages (It can be incorporated into the activity of No. 2.)	Mitigation / Adaptation	Rain forests in Savai	Technical Cooperation Type Project	FAO /GEF/ GOS	Medium	High	Medium - High	Medium	Medium - High
2	Sustainable watershed management	Community-based integrated watershed management with land use planning (including village level planning), establishment of community protected areas, formulation of village regulations on forest conservation, reforestation of degraded forest, and introduction of agroforestry and sustainable farming practices in a critical watershed (It can be combined with the activity of No. 1 or it can be implemented in parallel with the activity of No. 3.)	Mitigation / Adaptation	Priority watersheds	Technical Cooperation Type Project or Development Study including a pilot project scheme	FAO/ GEF GED/ EU	High	High	Medium - High	Medium - High	High
3	Strengthening of the forest ecosystem monitoring system	Upgrading and improvement of SamFRIS by using satellite images and ground truth to periodically monitor the forest resources (including mangrove) in the country (It can be implemented with the activity of No. 2.)	Mitigation / Adaptation	-	Technical Cooperation Type Project on a regional level	FAO	Medium	High	Medium	Medium	Medium
4	Protected area management	Assistance in management of protected areas in the country as well as other pacific islands through restoration of degraded forests and control of invasive species (Follow-up activities of the current JICA project)	Adaptation	Protected Areas (NPs / NRs)	Technical Cooperation Type Project on a regional level	JICA	Medium	High	Medium	Medium - High	Medium
5	Introduction of carbon credit mechanism	Capacity development of the staff of MNRE on carbon credit mechanisms (AR-CDM and REDD)	Mitigation / Adaptation	-	Training in Japan or other third countries	None	Low	High	Low	Low	Low
6	Rehabilitation and conservation of mangrove	Rehabilitation and conservation of existing mangrove forests through establishment of community conservation area and formulation of village regulations on mangrove conservation in a participatory manner (It can be combined with the activity of No. 7.)	Mitigation / Adaptation	Degraded mangrove	Technical Cooperation Type Project	CI / SPREP / WB (?)	Medium	High	Low	Low	Low - Medium
7	Conservation and monitoring of biodiversity	Community-based biodiversity conservation by establishment of community conservation areas and introduction of a collaborative monitoring system (It can be combined with No. 1, 3 or 6.)	Adaptation	Hot spots identified CI	Technical Cooperation Type Project	FAO / GEF /CI / SPREP	Medium	High	Medium	Medium	Medium

6. Tonga

6.1 General

6.1.1 Location and population

The Kingdom of Tonga is comprised of 171 islands, which encompass about 750 km² of land over about 347,000 km² of sea. Out of 171 islands, only 36 are the inhabited islands, which are further grouped into three major groups, namely, the Vava'u group to the north, Ha'apai group in the central, and Tongatapu group in the south.

According to Tonga 2006 Census of Population and Housing, a total population in the country in 2006 is estimated at about 102,000 as shown below.

Households and Population in the Country (1996 and 2006)

Island	Households and Population in 2006			Households and Population in 1996		
	(HHs)	(Persons)	(%)	(HHs)	(Persons)	(%)
Tongatapu	12,012	72,045	71	10,796	66,979	68
Vava'u	2,885	15,505	15	2,728	15,715	16
Ha'apai	1,377	7,570	7	1,469	8,131	8
Eua	905	5,206	5	820	4,934	5
Ongo Niua	350	1,665	2	381	2,018	2
Total	17,529	101,991	100	16,194	97,784	100

Source: Tonga 2006 Census of Population and Housing

As shown in the table above, the majority of the population concentrates in Tongatapu island. The natural population growth rate between 1996 and 2006 is estimated at 0.4 % p.a.

6.1.2 Land tenure status

All the lands in the country are principally owned by the King and his nobles. The Land Act has entitled every male civilian over the age of 16 to 3.4 ha of tax allotment for farming and 1,619 m² of town allotment for residential purposes. Land tenure right can not be sold to others, but can be inherited by the eldest male children.

At present, the Government does not provide any entitlement to tax and town allotments due to the limitation of the land in the country. In 2000, a total of 16,021 and 15,406 of tax and town allotments were registered. As compared with the total households in the above-mentioned table, it is considered that not all the households can hold the allotments.

6.2 Present conditions of forest ecosystems

6.2.1 Land use and forest cover

There is no clear data showing the present land use conditions in the entire country. Data available are fragmented and outdated at the same time¹. The data presented in the draft forest policy may be able to give some ideas of the current land use and forest coverage in the country.

¹ Studies of Thaman (1976), McCracken and Fitzgerald (1997), Burrows and Douglass (1966), Pacific Island Economies (1995), and Woser, et al. (1999)

Land Use and Forest Cover in Tonga (1999)

Land use	Tongatapu	Vava'u	Eua	Ha'apai	Niua's	Total
Woodland	619	1,133	1,454	2,450	802	6,459
Coniferous plantation	0	0	371	0	0	372
Non-coniferous plantation	0	0	130	0	0	130
Plantations <1	22,340	10,079	6,553	8,199	3,924	51,093
Wetland <2	1,319	373	0	0	76	1,767
Others	2,809	1,113	300	2,330	2,315	8,867
Total	27,086	12,698	8,807	12,979	7,116	68,687

Source: Draft Forest Policy (based on the data given by MLSNRE)

Note: <1: It includes the lands used for grassland, shrub, and cropland.

<2: It includes mangrove forests.

It is estimated that about 10 % of the total land are used as forests. However, many forests in the country except Eua and Vava'u have been disturbed and already fragmented by the human activities since most of the lands were already registered as tax allotments. There are contiguous indigenous forests remaining in the Eua National Park and Mount Talau National Park in Eua and Vava'u Islands, respectively. There are also about 500 – 750 ha of forest plantation composed of pine trees (*Pinus caribaea*), mahogany (*Swietenia macrophylla*), Eucalyptus spp., red cedar (*Toona ciliate*), sandalwood, and kauli (*Agathis robusta*) in Eua Island.

6.2.2 Forest classification, protected areas and forest ecosystems

There are several forest classification studies conducted from 1950 to 2000, but a different study made a different classification. The following table shows the forest types introduced by an inventory survey carried out by Wisser, et al. in Tongatapu and Euiki Islands in 1999.

Forest Types classified by Wisser, et al (1999)

Forest type	Outlines
Interior tall forest	It is found mainly in Eua and Vava'u Islands. It is dominated by a wide range of native trees, such as fo'ui (<i>Grewia crenata</i>), tavahi (<i>Rhus taitensis</i>), alvizia (<i>Ellatostachys falcate</i>), motou (<i>Cryotocarya hornei</i>), and ifi (<i>Inocarpus fagifer</i>).
Interior shrub	It might be found throughout the country, even in tax allotments. It is dominated by native woody species, such as fau (<i>Hibiscus tiliaceus</i>) or naturalized woody species such as guava (<i>Psidium guajava</i>) and sialemohe (<i>Leucaena leucocephala</i>).
Coastal forest and shrub	Coastal forest and shrub are found along the coastal line. The major forest species are fao (<i>Neisosperma oppositifolium</i>), kotone (<i>Myristical hypargyaea</i>), fotulona (<i>Hernandia nymphaefolia</i>) and tanetane vao (<i>Polyscias multijuga</i>), while those for shrub are fa (<i>Pandanus tectorius</i>) and ngahu (<i>Scaevola tacada</i>).
Swamp forest	It is composed of coastal swamp forest and swamp/marsh forest. The dominant species of coastal swamp forest is feta'aun (<i>Excoecaria agallocha</i>).
Coconut with secondary woody vegetation	This vegetation typically occurs where land has been abandoned from agriculture. The vegetation under coconut story is similar with the interior shrub. What made it distinguished from it is the presence of coconut trees.
Plantation	It is limited in Eua Island. The major species planted in the plantation are pine (<i>Pinu caribaea</i>), mahogany (<i>Swietenia macrophylla</i>), Eucalyptus spp., red cedar (<i>Toona ciliate</i>), sandalwood, and kauli (<i>Agathis robusta</i>)

Source: Wisser et. Al (1999) modified by the JICA Study Team (2009)

Though the above-mentioned data could give general ideas of forests in Tonga, there is a need to

update them on the basis of latest spatial information with a ground truth survey, so that the Government could properly manage and conserve the remaining forest resources in the country.

As mentioned in section 2.4.3, there is a contiguous forest plantation of about 500 – 750 ha in Eua Island. The major species in the plantation are pine trees (*Pinus caribaea*), mahogany (*Swietenia macrophylla*), Eucalyptus spp., red cedar (*Toona ciliate*), sandalwood, and kauli (*Agathis robusta*). It used to be managed by the Forestry Division, but currently managed by Tonga Timber Ltd., which is a state company established in 20003. According to the Forestry Division of MAFFF, the forest management carried out by Tonga Timber Ltd. is insufficient and needs to be improved. In fact, there seemed to be less weeding or thinning applied in the plantation when the site observation was carried out by the Team member in April 2009. On the other hand, there was also no sign of large scale logging.

A total of 19 areas are listed in NBSAP as the protected areas in the country. Out of 19, seven protected areas are terrestrial as shown below.

Existing Protected Areas in Tonga (as of 2006)

Category	Name	Area (ha)	Type
National parks	Eua NP	450	Terrestrial
	Kao NP	1,250	Terrestrial
	Mt Talau NP	-	Terrestrial
	Tofua NP	4,990	Terrestrial
Nature reserve	Vaomapa NR	20	Terrestrial
Reserve	Ha'atafu Beach	80	Marine
	Halaumama's Reef	260	Marine
	Maliona Island Park and Reef	73	Marine
	Monuafe Island Park and Reef	33	Marine
	Mui Hopo Hoponga Coastal Reserve	-	Marine
	Pangaimotu Reef	49	Marine
Park/Historical site	Ha'amonga Trilithon Park	23	Terrestrial
	Vava'u coastal Garden Marine Park	-	Marine
Multiple Use Conservation	Haapai Conservation Area	1,000,000	Terrestrial & Marine
Other areas	Neiafu Harbour Wreck	-	Marine
	Swallows cave	-	Marine
Sanctuary	Mount Reef	-	Marine

Source: National Biodiversity Strategy and Action Plan (2006)

Although those areas were proclaimed as the protected areas, the Government seems to have hardly managed or protected there areas strictly due to limited number of staff, limited budget allocation, limited capacity of the staff, and lack of facilities and equipment needed for management.

Though the existing research on terrestrial biodiversity/ecosystem is limited, NBSAP gives the brief descriptions of Tonga's terrestrial ecosystem as follows:

Description of Terrestrial Ecosystems in Tonga

Ecosystem	Summary of Description
Fauna	Birds in Tonga are the most diversified vertebrates. Out of 74 species, 51 are resident breeding species, which consist of 22 native land birds, 23 sea bird species, and 6 introduced. The other 23 species are migrant or vagrant birds. A total of six threatened bird species are found in the country. In addition to birds, two species of fruit bad are also found mainly in forests.
Flora	Tropical rain forest is the sole ecosystem that contains diversified flora in the country. The majority of this forest is situated in Eua Island. The major species are fo'ui (<i>Grewia crenata</i>),

Ecosystem	Summary of Description
	tavahi (<i>Rhus taitensis</i>), alvizia (<i>Ellatostachys falcate</i>), motou (<i>Cryotocarya hornei</i>), and ifi (<i>Inocarpus fagifer</i>). In the other islands, such as Kao, Fonualei, Late, Niuatopotapu, and Niuafouu, tropical volcanic crater vegetation has developed. About 770 species of vascular plants, which are 70 ferns (of which three endemic species), three gymnosperms (one endemic) and 698 angiosperms (nine endemic species), have been confirmed

6.2.3 Catchments areas and mangroves

Since almost all the islands except Eua and some other outer small islands have flat and rolling (or gently sloping) terrain, there are few critical watersheds/catchments existing in the country in general. According to the Tonga Water Board, it is the only Eua Island that people rely on the surface water for domestic purposes. In Eua Island, a series of small mountains or hills run through the island from south to north and several streams from the mountains/hills flow into the western side of the island. Five of them are currently used as the sources for public water supply to people living in Eua Island. The majority of the watershed area was leased to the Tonga Timber Ltd. (TTL) as the forest plantation.

Recently, the Tonga Water Board co-worked with the Department of Land and Survey and the Forestry Division to demarcate the catchment area and designated the area as a watershed reserve. As a result, a total of 45 tax allotments in the watershed were urged to relocate and the part of the forest plantation was transferred to the Department of Land and Survey. The Tonga Water Board set up several signboards at the boundaries of the watershed and has patrolled the areas with assistance of the Forestry Division. Since the area was designated as a watershed reserve, the forest degradation has not progressed apparently. However, the quality of water from the watershed is still muddy or not clean especially in the rainy season due to the deforestation or forest degradation in the past. There is a need to rehabilitate the degraded lands, which used to be used for farming, and also to properly manage the watershed and its forest through application of silvicultural practices to enhance its function of conserving water quality and quantity.

Like in the case of terrestrial forests, there is no updated data of mangrove forest in Tonga. The latest study carried out is apparently the monitoring done by Prescott N. et al. in 2001. Accordingly, there used to be about 1,000 ha of mangroves in the 1980s. Since then, the mangrove areas have been reduced by clearance and conversion to other land use forms and cut down to around 500 ha. The present coverage of mangrove may be lower than the level of the 1990s since coastal reclamation has progressed especially in shores adjacent to Nuku' alofa. Though the reduction of mangroves has progressed in the suburb of Nuku alofa, the largest mangrove area in Tonga is still situated in Tongatapu, particularly around the Fanga Uta Lagoon. According to a study carried out in 1983, about 45 km out of 58 km shorelines of Fanga Uta lagoon were covered with mangroves.

In fact, the entire lagoon including all mangroves and foreshore was proclaimed as a protected area in 1974 under the Birds and Fish Preservation Act (1915) owing to its important environmental value. All commercial fishing, trawling, and setting of fish fences and traps, discharge of effluent into the lagoon, dredging, construction of any building, and cutting/damaging of mangrove trees have been prohibited in principle.

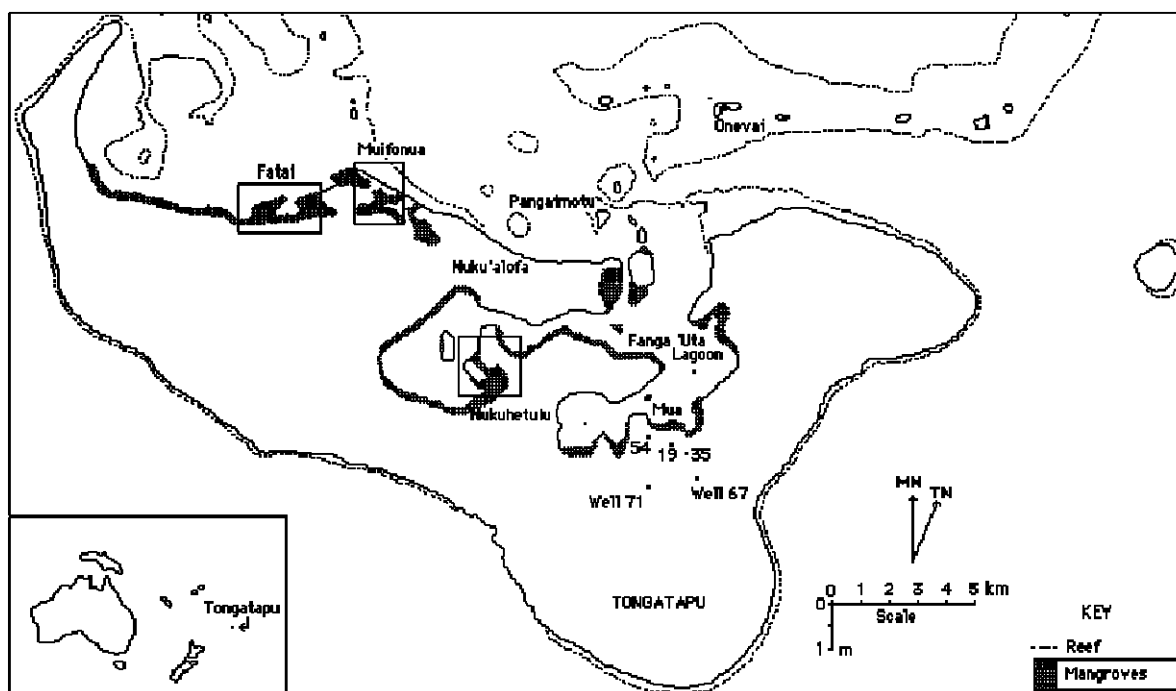


Figure 1. Mangrove distribution on Tongatapu.

Source: Working Paper No. 5, First Report on Development of A Mangrove Environmental Management Plan for Tongatapu, MLSNR, 1998

Mangrove Distribution in Tongatapu (1998)

The dominant species of mangroves in the country are Rhizophoraceae (*Rhizophora spp.*) and Euphorbiaceae (*Excoecaria agallocha L.*).

6.2.4 Major threats to forest ecosystems and foreseeable adverse effects caused by climate change

The principal threat in the past was the expansion of farm land or conversion of forests into farm lands as population increased. In fact, most of the natural forests in Tongatapu have been replaced with farmlands (annual crop farms or coconut farms) or residential areas. Since almost all the remaining natural forests are far from the residential areas or difficult to access due to its steepness, the natural forests are not presently under significant human pressure except the forest plantation in Eua Island.

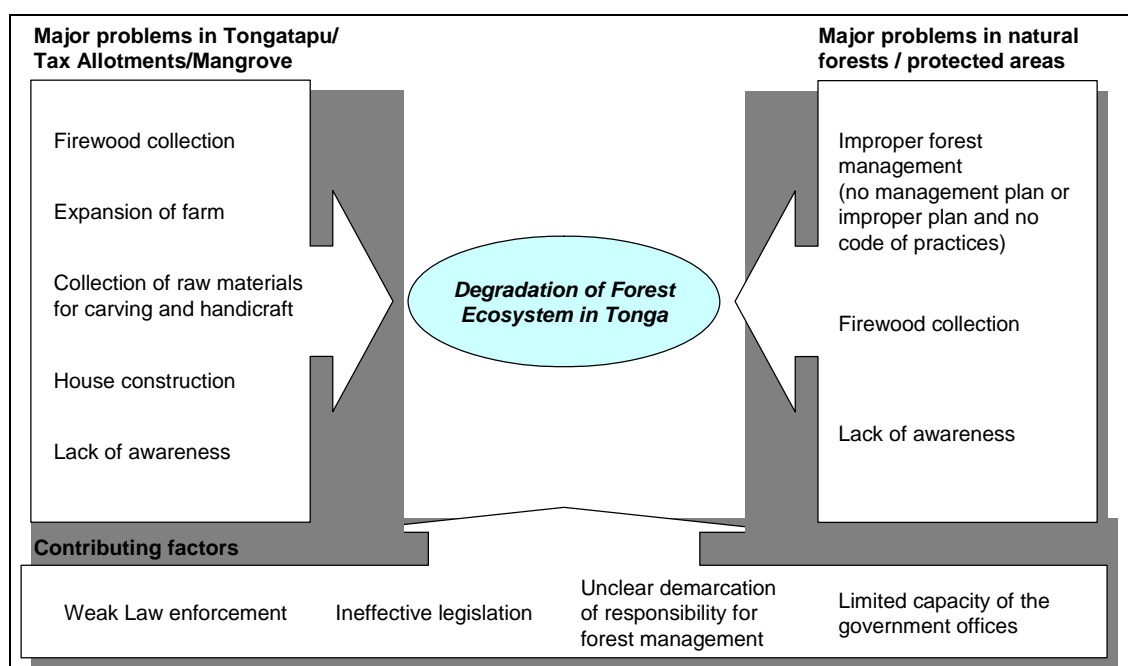
On the hand, the forests in Tongatapu and those in tax allotments in other outer islands have faced the constant exploitation or deforestation due to firewood collection, expansion of farms, and collection of raw materials for handicrafts. In fact, the situation of mangroves, especially those in Tongatapu, might be severer than the forest. As reported in section 2.4.6, it is speculated that a significant areas of mangroves have been converted into farms or residential areas.

Forest management of Tonga Timber is the main concern for managing the forest plantation in Eua Island. Sustainable forest management could be materialized only when the company would operate management activities in a proper manner in accordance with an operation plan, which should be approved by the Forestry Division prior to the operations. It is also quite important that a code of forest practice be in place together with necessary legislative support as soon as possible.

In addition to the ineffective/outdated legislation, weak law enforcement, unclear demarcation of responsibility for forest management among the government organizations, and limited capacity of the

government organizations have also contributed to deforestation.

The following drawing illustrates the current threats to the forest ecosystems in the country.



Current Major Threats to Forest Ecosystems in Tonga

As climate change progresses in the country, the following adverse affects might be generated in the future if the situation is left as it is.

- Shortage of water supply in the public water supply in Eua (by long droughts)
- Deterioration of quality of the public water supply in Eua (by frequent strong rains)
- Expansion of crop damage caused by sea spray and/or strong wind (by frequent cyclones)
- Erosion of lands (by high tide / rise of sea level)
- Degradation of forest ecosystem / Depletion of precious species (fauna and flora) (by frequent cyclones, droughts and invasive species)

6.3 Relevant policies and regulations

6.3.1 Laws and regulations relating to forest and biodiversity conservation

The following acts and government regulations relevant to forest and biodiversity conservation in the county were reviewed in the field work.

- a. Forests Act 1961
- b. Parks and Reserves Act 1976 (revised in 1988)
- c. Lands Act 1927 (revised in 1988)
- d. Environment Management Bill 2002

As of present, the Government has yet to formulate any bills on water resource management and biodiversity conservation.

The following table shows the relevance of the above-mentioned legislative documents to climate change and/or forest ecosystem conservation.

Reviews of the Existing Acts and Bills relevant to Forest Ecosystem Conservation

Acts/Regulations	Summary or Relevance to climate changes
Forests Act 1961	The act says that the Government can demarcate any alienated land as a forest reserve or reserve area and MAFFF can develop regulations to prohibit or regulate exploitation of forest produce and any activities in forest reserves. It gives an overall framework for management of forest resources in the country, but there is a need to have detailed regulations for the Ministry to manage forests properly. In addition, there is no description of community participation in forest management. The act should be revised or amended so that forest resources in the country could be enhanced and maintained in a sustainable and participatory manner.
Parks and Reserves Act 1976 (revised in 1988)	This act states that a government authority named Parks and Reserves Authority should be established for management of national parks and reserves or the Ministry of Land should be the responsible entity until the Privy Council appoints and determine the members of the authority. The act allows the Authority to make regulations needed for management of national parks and reserves. However, the act does not give clear descriptions or criteria for national parks and reserves.
Lands Act 1927 (revised in 1988)	The act clearly defines that all the lands of the country is the property of the crown, but it also states that every Tongan male upon the age of 16 shall be entitled to receive tax and town allotments for agriculture and residential purposes, respectively. The allotments can not be sold to others, but can be used as mortgage. The act also states that the land lying within 15.24 meters from the high water mark of the ordinary tide are the property of the Crown and can not be used as Tax allotments. But many of the coastal land have been cleared and used for residential or agricultural purposes on the ground.
Environment Management Act 2002 (or still Bill ?)	This act defines the functions and mandates of the Department of Environment (DoE). According to the act, the major functions of DoE are liaison and coordination with other government offices, provision of assistance and advice, formulation of plans and policies, promotion of public awareness and facilitation of NGOs participation. The fields that DoE should look at: i) climate changes, ii) ozone depletion, iii) waste management, iv) desertification, v) wetland and coastal land management, vi) conservation of endangered species, vii) biodiversity, and viii) environmental management of international water.

6.3.2 Policies and strategies relating to forest and biodiversity conservation

The following policies and strategies relevant to the target sectors were reviewed during the field work.

- a. Draft national forestry policy (2008)
- b. National Biodiversity Strategy and Action Plan (2006)
- c. Strategic Development Plan Eight (SDP 8) (2006/7-2008/09)
- d. Draft National Strategic Planning Framework (2009)

Some findings gained through reviews of the policies and strategies listed above are highlighted below.

Reviews of the Existing Government Policies and Strategies relevant to Forest Ecosystem Conservation

Acts/Regulations	Relevance to climate changes / forest ecosystem conservation
Draft National Forestry Policy (2008)	The main objective of the draft policy is to support the sustainable management of forests and trees in Tonga. Toward this end, a total of 80 policy statements are enumerated in the draft policy. In relation to this JICA preparatory study, it is noted that the draft policy states that: i) a comprehensive national forest inventory will be made, ii) deforestation of indigenous forests will be halted, iii) critical watershed areas will be identified and the watershed reserve in the Eua forest plantation will be protected, iv) extractive activities and invasive species will be controlled in national parks and reserves, v) a mandatory code of forestry practice will be developed, vi) planting firewood trees in tax allotments will be promoted, vii) agroforestry practices will be promoted, viii) the Forestry Division will encourage and support local communities in tree planting, ix) the Forest Division will be empowered under the new forestry act, and x) the Forestry Act will be reviewed and revised to meet the international standards on sustainable forest management.
National Biodiversity Strategy and Action Plan (2006)	Sustainable management of forest ecosystems and the related resources is one of the strategic goals of NBSAP. To achieve this goal, NBSAP sets the following six objectives, namely, i) to minimize the loss and degradation of forest ecosystems and habitats due to agricultural expansion, ii) to ensure the optimal and sustainable allocation and use of the biodiversity and natural resources, iii) to ensure the sustainable management of natural forest resources, iv) to improve the management of National Parks and Reserves, v) to collect and manage relevant information in an effective and systematic manner, and vi) to increase public understanding of and support for the conservation/sustainable use of forest ecosystems.
Strategic Development Plan Eight (SDP 8)	Environmental protection or ensuring its sustainability together with disaster risk management is one of the goals of SDP8. It states that depletion of natural resources is one of the problems that SDP 8 should tackle. However, there is few description relating to conservation of forest ecosystem. In fact, only one strategy (strategy 7) under “Economic Sector Strategies” for Goal 1: Create a better governance environment”, states “ to promote commercial planting of timber and high valued tree species for export on government lands, large land holding organizations and private-owned farmland.” Though “ensuring environmental sustainability” is one of the goals of SDP 8,
Draft National Strategic Planning Framework (2009)	For the next five years, the Draft National Strategic Planning Framework states that the Government is committed to integrate the principles of sustainable development into all the policies and to take responsible actions for future generation. Effective energy use, introduction of renewable energy sources, efficient use of infrastructure and optimum land use are pointed out as important aspects.

6.3.3 Progress of preparation of second national communication

The Government of Tonga, specifically Department of Environment, is currently preparing the mitigation and adaptation plans and plans to draft them in June and September, 2009, respectively. Those plans will be incorporated into the Second National Communication in Response to its Obligations under the UNFCCC.

6.4 Stakeholder analysis

6.4.1 Government organizations related to the Sectors

The Ministry of Agriculture, Food, Forestry and Fisheries (MAFFF) and Ministry of Land, Survey, Natural Resources and Environment (MLSNRE) are the main actors for implementing any mitigation

and adaptation measures concerned with forest ecosystem conservation. In addition to them, two state corporations, namely, Tonga Timber Ltd. And Tonga Water Board, are also the important stakeholders for forest ecosystem conservation especially in Eua Island. The following sections give the brief outlines of both ministries.

(1) MAFFF

The Ministry of Agriculture, Food, Forestry and Fisheries (MAFFF) is constituted of the following eight divisions under Director of the ministry. The organization chart of the ministry is presented in **Figure 6.1.**

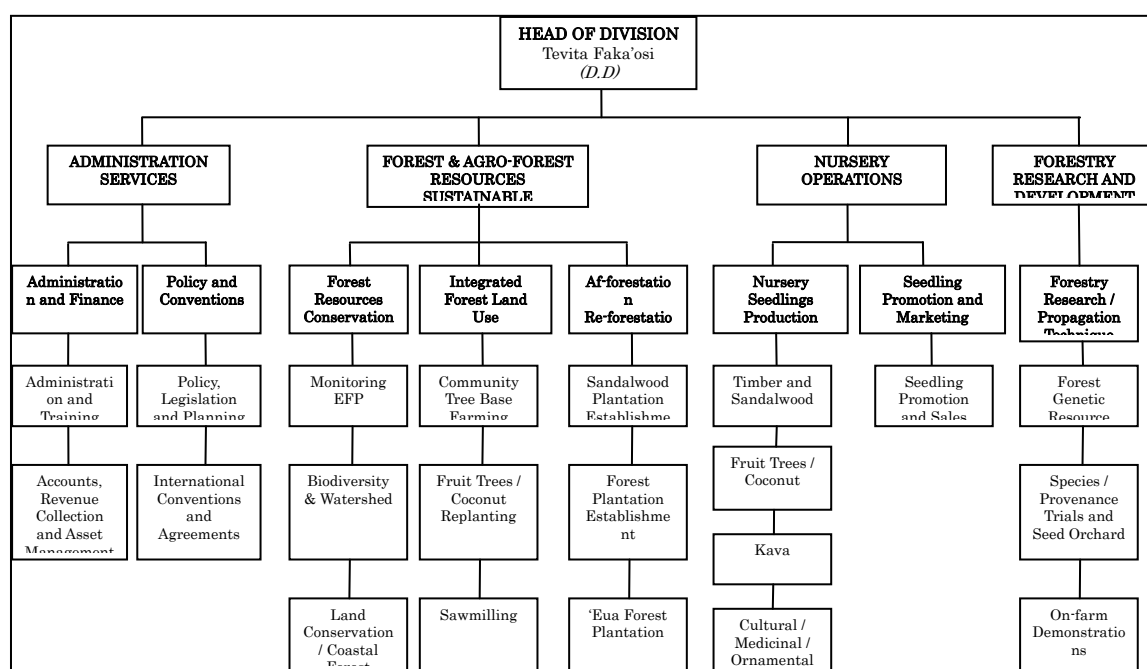
- a. Corporate Service Division
- b. Research and Extension Division
- c. Bio-security and Quality Management Division
- d. Food and Women Community Development Division
- e. Forestry Division
- f. Livestock Division
- g. Outer Island Operations
- h. Fisheries Division

The Forestry Division will be the main counterpart for mitigation and adaptation measures related to the conservation of forest ecosystems and environmental monitoring. The main objectives of the division and major accomplishments made by the division in 2007 are outlined below.

Main Objectives of the Forestry Division and Its Major Accomplishment in 2007

Items	Outlines
Objectives	<ol style="list-style-type: none"> 1. Good corporate governance / management 2. Sustainable management of forest resources 3. Afforestation / Reforestation 4. Seedling production 5. Forestry researches / trials
Accomplishments in 2007	<ol style="list-style-type: none"> 1. Produced about 62,000 seedlings of several species, e.g., ornamental, cultural, timber, coastal, medicinal and cash crops. 2. Sold about 12,600 seedlings and earned T\$ 14,500. 3. Replanted about 680 coconut seedlings. 4. Vegetatively propagated about 150 fruit seedlings. 5. .Contributed to formulation of the National Strategic Development Plan 8. 6. .Contributed to development of national forest policy. 7. .Monitored and supervised the operations of Tonga Timber Limited in Eua Island.
Human resources	<p>In 2007 the division was constituted of 42 persons, which consist of:</p> <ul style="list-style-type: none"> - 2 Deputy Directors; - 1 Principle Forestry Officer; - 1 Forestry Officer; - 12 Technical Officers; - 12 Assistants; - 5 Drivers; and - 9 Casual laborers.

Sources: Annual Management Plan 2009 (MAFFF) and Annual Report 2007 (Forestry Division)



Sources: Annual Management Plan 2009 (MAFFF)

Organizational Structure of the Forestry Division

When the Forestry Division transferred its part of the functions to Tonga Timber Limited in the middle of the 2000s, the division also handed over a part of its resources, such as human resources, facilities and equipment. At present, its capacity seems too limited to fulfill its mandates and expected functions. In fact, the division focuses its effort on seedling production at present.

(2) MLSNRE

The Ministry of Land, Survey, Natural Resources and Environment (MLSNRE) is another government organization responsible for management of environment and natural resources in the country. It has four departments under the chief director of the ministry as shown in **Figure 6.2**.

- a. Department of Strategy and Corporate Management
- b. Department of Land Management
- c. Department of Land Information Management
- d. Department of Environment and Natural Resource Management

Among other, the Department of Environment and Natural Resource Management (DENR) is considered the important player in the fields of forest ecosystem conservation and environmental monitoring. The following table shows the core activities with the available human resources of the respective sections under the department.

Major Activities and Human Resources of the Sections of DENR

Section (No of staff)	Core activities
Environmental planning (4 persons)	<ol style="list-style-type: none"> 1. Project development 2. Human resource development 3. Annual management planning 4. Legislation and policy making

Section (No of staff)	Core activities
	5. Supervision of EIA application 6. Liaison to International conventions 7. Monitoring and supervision of outer island activities
Waste management (2 persons)	1. Monitoring of Tapuhia activities 2. Inventory of amount of recyclables in a day and waste characteristics 3. Development and management of a database 4. Implementation of Stockholm convention and Waigani convention
Conservation (4 persons)	1. Monitoring of National Parks and Reserves under Parks and Reserves Act 2. Protected area management 3. Implementation and monitoring of activities under the CBD 4. Implementation and monitoring of activities under the Cartagena protocol 5. Survey and monitoring 6. Public awareness raising
Climate change (3 persons)	1. Implementation and monitoring of activities under the UNFCCC 2. Policy making on climate change 3. Public awareness raising
Research and assessment (4 persons)	1. Implementation of EIA Act 2. Implementation and monitoring of activities under the Montreal protocol 3. Land development and management issues 4. Survey and monitoring of coastal and marine areas 5. Asset inventory 6. Public awareness raising
Information communication (4 persons)	1. Information dissemination 2. ERIC 3. Customer services 4. Media production and broadcasting 5. IT services 6. Asset inventory

Sources: Annual Management Plan 2008/2009 (DENR, MLSNRE)

Like in the case of the Forestry Division, DENR also has difficulties in fulfilling its mandates due to the shortage of human resources, lack of operational budget, limited facilities/equipment, and insufficient staff's capacity.

(3) Tonga Timber Ltd.

Tonga Timber Ltd. is one of the public enterprises established in the public sector reform by separation of the functions and related resources from the Forestry Division in 2003. The main function of Tonga Timber Ltd. is to produce / supply quality timber for in-country industries and any domestic utilization of timber. When it was established, the Memorandum of Agreement (MOA) on the management of the production forest in Eua Island was exchanged between Tonga Timber Ltd. and the Ministry of Agriculture, Food, Forestry and Fisheries (MAFFF). Hence, a total of 470 ha of the production forest in Eua Island are now under the management of Tonga Timber Ltd at present.

(4) Tonga Water Board

Tonga Water Board, which is also a quasi-government body, was established in 1966 in accordance with the Government legislation of TWB Act Cap-92, which was replaced by TWB Act 32 – 2000 and subsequently complimented by the Public Enterprise Act – 2002.

The major function of Tonga Water Board are to provide quality water supply and services for the major four places, namely Nuku'alofa, Makave and Neiafu, Holopela and Pangai-Hihifo, and Eua,

and to upgrade village water supplies of rural communities.

6.4.2 Donors and International organizations

The following programs / projects had / have been implemented with assistance of donors and other international organizations in the country,

Programs/Projects relating to combating climate changes

- a. Enabling Activities to Prepare its First National Communication in Response to its Obligations under the UNFCCC (UNDP/GEF) - Completed
- b. National Capacity Assessment for Environmental Management (UNDP/GEF) - Completed
- c. Pacific Island Renewable Energy Program (UNDP/GEF) - Completed
- d. Climate Change Enabling Activities Projects (UNDP/GEF) – On-going
- e. Community-based Adaptation Program (UNDP) – On-going
- f. Pacific Islands Greenhouse Gas Abatement through Renewable Energy Project (UNDP/GEF) – under planning
- g. Implementing Sustainable Integrated Water Resource and Wastewater Management in the Pacific Island Countries (UNDP/GEF) – under planning
- h. Pacific Adaptation to Climate Change Project (UNDP/GEF) – under planning

Programs/Projects relating to conservation of forest ecosystems

- a. Tonga Forestry Program – Eua Plantation Project (NZ AID) – Completed (in 2004?)
- b. JOCV assistance in forest management and mapping (JICA) - Completed (in 2004?)
- c. National Biodiversity Strategy and Action Plan (UNDP/GEF) – Completed
- d. South Pacific Biodiversity Conservation Programme (UNDP/GEF) - Completed
- e. Formulation of a National Forest Policy (FAO) – Completed
- f. Development of Land Use Policy in Tonga (FAO) – Completed
- g. Rehabilitation of littoral/coastal forest (NZ AID) - Completed
- h. Mangrove Plantation Project at Kanokupolu Village (JICA) – Completed
- i. Forestry Code of Logging Practice (SPC) – On-going
- j. Regional Program on Adaptation to Climate Change in Pacific Island Region (SPC/GTZ) – On-going
- k. Capacity Building for Sustainable Land Management in Tonga (UNDP/GEF) – On-going
- l. Prevention, Control and Management of Invasive Species in the Pacific Islands (UNEP/GEF) – under planning
- m. Programme of Work for Protected Areas (UNDP/GEF) – under planning

UNDP (using GEF fund), FAO, GTZ, and SPC are major donors or supporting organizations in the fields of forest ecosystem conservation in the country at present. Therefore, it would be important for JICA to closely consult and coordinate with those organizations in the formulation of any programs/projects relating to forest-related adaptation/mitigation measures in the future.

6.5 Needs assessment

6.5.1 Policy direction in relation to combating climate changes

The current government policies were analyzed and key strategies relating to mitigation and adaptation measures in the fields of conservation of forest ecosystems and environmental monitoring were identified as shown below.

Assessment of the Existing Government Policies and Strategies

(1) Draft Forestry Policy

Policy Direction (Key strategies relating climate changes)	Development needs
<u>Inventory</u> a. A comprehensive national forest inventory will be established. b. The Forestry Division will collaborate with MLSNRE to incorporate data on forests (areas, types, and distribution) into the existing database.	a. National forest inventory b. Integration of inventory data into spatial information database
<u>Forest protection</u> a. Tonga will halt deforestation of indigenous forests. b. Tonga will promote reforestation. The area and stocking of indigenous forest will be regenerated by enrichment planting, while afforestation (tree planting) will be promoted in tax allotments.	a. Reforestation / afforestation b. Proper management of the remaining indigenous forests
<u>Conservation of biodiversity</u> a. Forest ecosystems will be protected by conserving forests in National Parks, Reserves, and Forest Reserves. b. Sustainable forest management will contribute to the full implementation of the National Biodiversity Strategy and Action Plan 2006.	a. Proper management of the protected areas b. Sustainable forest management especially in the remaining indigenous forests
<u>Soil conservation</u> a. Erosion prone slopes in both tax allotment and government owned lands will be protected from soil erosion. b. Eroded areas will be rehabilitated by tree planting.	a. Land use planning in sloping area b. Afforestation in eroded areas
<u>Coastal plantation</u> a. Shoreline trees will not be removed. b. Coastal areas experiencing erosion will be rehabilitated by planting trees e.g., mangroves and pandanus. c. Wetlands will be protected	a. Afforestation/ reforestation of littoral or mangrove forests
<u>Water conservation</u> a. Critical watershed areas will be identified through the national forest inventory and protected. b. The watershed area in the forest plantation in Eua will be maintained and protected.	a. Preparation of a watershed management plan in Eua b. Protection of watersheds
<u>Climate change</u> a. Tonga will vigorously explore the opportunity to form partnerships with developed countries with a view to mitigate climate change by sustainably managing forests in Tonga	a. Planning and implementation of forest management plans of the major forest areas
<u>National Parks and Reserves</u> a. No extractive activity will be undertaken in National Parks and Reserves. b. Control of invasive species, control of fires and maintenance of forest health will be prioritized in the management of National Parks and Reserves.	a. Management of the protected areas b. Control of invasive species
<u>Forest reserves</u> a. All indigenous forest on unallocated land will be proclaimed as forest reserves. b. Forest reserves will be managed for a sustainable supply of forest product other than industrial round wood.	a. National forest inventory and identification of potential forest reserves b. Planning and implementation of forest management plans
<u>Code of forest practice</u>	a. Preparation of a Code of

Policy Direction (Key strategies relating climate changes)	Development needs
<p>a. A mandatory Code of Forest Practice will be developed by the Forestry Division with plantation owners and other stakeholders.</p> <p>b. The Forestry Division will be empowered to enforce the Code of Forest Practice.</p>	<p>Forest Practice</p> <p>b. Enforcement of a Code of Forest Practice</p>
<p><u>Agroforestry</u></p> <p>a. Agroforestry will be promoted as one of the productive land uses.</p> <p>b. The Forestry Division will provide education and extension to promote trees on farms.</p>	<p>a. Promotion of agroforestry practices</p>
<p><u>Tree planting</u></p> <p>a. The Forestry Division will raise a wide range of trees for planting on Tax Allotments, rehabilitation of degraded sites, enrichment planting in indigenous forests, and stabilization of the coastal strips.</p> <p>b. Planting of high value species will be promoted.</p>	<p>a. Production of improved tree species based on the indigenous species</p> <p>b. Seedling production</p>
<p><u>Forest and Tree health</u></p> <p>a. The Forestry Division will collaborate with regional and international organizations and neighboring countries in combating the spread of invasive species and promoting forest health.</p>	<p>a. Development of network with other organizations to obtain knowledge / experience in control of invasive species</p>
<p><u>Awareness and education, community participation</u></p> <p>a. Awareness about the value of forests will be raised and promoted.</p> <p>b. The Forest Division will encourage and support local communities in tree planting.</p>	<p>a. Public awareness and education</p> <p>b. Implementation of a pilot project of community-based forest management</p>
<p><u>Role of the Forestry Division</u></p> <p>a. The Forestry Division will be empowered to:</p> <ul style="list-style-type: none"> - undertake and update the forest inventory; - develop and update forest management plans; - establish Forest reserves and ensure their management; - issue licenses for commercial logging; - ensure forest law enforcement; - develop and administer a Code of Forestry Practice - assist private tree planting - encourage community-based forestry - carry out tree planting and rehabilitate degraded land. 	<p>a. Capacity development of the Forestry Division on the listed aspects.</p>

(2) National Biodiversity Strategy and Action Plan

Policy Direction (Key strategies relating climate changes)	Development needs
<p><u>Arresting Agro-deforestation</u></p> <p>a. A comprehensive land use planning should be carried out to holistically allocate the lands to proper land use for sustainable development of Tonga in a long run.</p> <p>b. The following short-term measures should be taken to reduce deforestation caused agricultural activities.</p> <ul style="list-style-type: none"> - to effectively enforce the existing legislation to protect the remaining forests in Eua, other outer islands, and water catchment areas - to promote replanting trees on the boundaries of farm and in degraded areas - to develop and implement management plans of the remaining forests and watersheds 	<p>a. Preparation of management plans of the selected remaining natural forests / watersheds</p>
<p><u>Integrated Land Use Planning</u></p> <p>a. Forests essential for water resource management, biodiversity conservation, human settlement, infrastructure development, social amenities, etc., should be defined and set aside from agricultural development.</p> <p>b. Introduction of planning tools such as GIS and remote sensing, collection of updated information, set-up of supportive legislation, public consultation, and introduction of a multi-disciplinary approach should be done.</p> <p>c. There is a need to coordinate with a newly implementing project named</p>	<p>a. Establishment of baseline data of forest resources using GIS and satellite images</p>

Policy Direction (Key strategies relating climate changes)	Development needs
Sustainable Land Management Project funded by UNDP/GEF.	
<u>Sustainable Forest Management</u> a. The remaining natural forests in Eua, Kao, Tofua, Late and Tafahi islands should be protected until the integrated land use plan is in place. b. The forests in Tongatapu, which are mainly secondary and mixed with exotic and/or invasive species, should be improved and retained to maintain its functions such as soil protection, sources of firewood and raw materials for building and others. c. Mangroves should be protected from reclamation, unlawful mining and pollution. Replanting should also be promoted in some areas.	a. Establishment of baseline data of forest resources using GIS and satellite images b. Development of a/ land use and forest management plan/s of the selected remaining forests c. Protection and rehabilitation of mangroves
<u>Conservation Areas</u> a. It is necessary to identify, describe, and map all the existing ecosystems in the country. b. The Eua National Park Management Plan nee to be executed. c. Community participation in conservation of the protected areas should be promoted.	a. Establishment of baseline data of forest resources using GIS and satellite images b. Review and implementation of Eua National Park Management Plan
<u>Public Awareness and Education</u> a. Appropriate choices or combination of media should be made to reach the necessary information to right target groups timely.	a. Implementation of public awareness campaign

6.5.2 Activities done by the government and donors/international organizations

(1) Actions taken by the Government

In relation to the above mentioned directions, the government organizations have taken the following actions so far.

Assessment of the Past and On-going Activities by the Government

Stakeholders	Major activities	Contribution to the key strategies	Remarks
Forestry	Promotion of coconut plantation	Promotion of introduction of agroforestry in tax allotments	About 700 seedlings were planted in 2007.
	Production and provision of seedlings at the subsidized prices	Promotion of introduction of agroforestry in tax allotments	About 62,000 seedlings were produced in 2007.
	Monitoring of forest operations by TTL	Sustainable forest management in the forest plantation in Eua	Malpractice was reported to the higher authority of MAFFF.
Tonga Water Board	Demarcation of watershed area in Eua island	Protection of the watershed area in Eua	Signboards were established in the boundaries of the area.
	Relocation of tax allotments	ditto	All the tax allotments were relocated.
	Periodical monitoring of the watershed area (once a month)	ditto	Monitoring is carried out only once a month.

(2) Actions taken by donors and international organizations

On the other hand, the following table shows interventions/programs that have been carried out or are expected to be introduced by donors and international organizations.

Assessment of the Past and On-going Activities done by Donors and International Organizations

Projects / Programs	Activities/Accomplishments	Remarks
Tonga Forestry Program – Eua Plantation Project	Prepared forest management plan with a business plan for Eua Plantation in the beginning of the 2000s.	A forest management plan and a business plan were in place, but it seems that they have not been implemented well.
JOCV assistance in forest management and mapping	Prepared a forest cover map of Eua Plantation using GIS.	All the data were transferred to TTL, but they have been never used and updated.
National Biodiversity Strategy and Action Plan	Developed the National Biodiversity Strategy and Action Plan.	NBSAP is the replacement of the policy on biodiversity conservation in the country.
South Pacific Biodiversity Conservation Programme	Proclaimed Ha'apai Conservation Area with capacity development of MLSNRE and local communities in managing the area. A forestry inventory in Kao and Tofua in Ha'apai was also conducted.	The activities focused only on Ha'apai area.
Formulation of a National Forest Policy	Drafted the forestry policy in 2008. The draft policy was submitted to the higher authority of MAFFF for review and approval.	-
Development of Land Use Policy in Tonga	Developed the land use policy in 2008. However, the draft policy is disregarded, since it was prepared without consulting the relevant organizations and personnel of MAFFF.	-
Rehabilitation of littoral/coastal forest	About 2 km of littoral forest were established/rehabilitated as a pilot project.	It was effective in protecting farms from salt spray damage.
Mangrove Plantation Project at Kanokupolu Village	About 20,000 seedlings of mangroves were planted along the sea walls newly constructed.	Mangroves were expected to protect the sea walls and contribute to soil sedimentation in shore.
Forestry Code of Logging Practice	Currently preparing a Code of Forestry Practice, which will be the guidelines for logging companies / operators to follow in forest exploitation	It is necessary for sustainable forest management in Eua Plantation.
Regional Program on Adaptation to Climate Change in Pacific Island Region	Planning to prepare the land use policy and to implement a pilot project to prepare and implement a land use plan at the selected areas	The draft land use policy to be developed in the program will be taken into account in forest and watershed management.
Capacity Building for Sustainable Land Management in Tonga	Planning to prepare National Action plan and to develop capacities of the relevant organizations in sustainable land management.	The program plans to prepare a present land use map using GIS and satellite images in the course of the program.
Programme of Work for Protected Areas	The scope of the project is still under discussion.	The scope of the project is still under discussion.

Source: Interviews made by the JICA Study Team (2009), National Biodiversity Strategy and Action Plan (2006), Draft Forestry Policy (2008), and Brief Project Description of Capacity Building for Sustainable Land Management in Tonga (2009).

Although the Government as well as donors and international organizations have already carried out several interventions/programs relating to mitigation and adaptation measures, many of them are at small scale or pilot project level. Furthermore, some of the interventions have not been continued or the plans prepared have not been implemented by the Tongan counterpart after the end of the programs/projects.

6.5.3 Potential interventions required

Based on the information given above, the potential mitigation and adaptation measures relating to conservation of forest ecosystems and environmental monitoring were identified as shown in **Table 6.1**.

6.1. In identification of the development needs, the following aspects were taken into account.

- Potential interventions should address the current issues on forest ecosystem conservation;
- Potential interventions should be in line with the policy direction of the government;
- Duplication or overlap with the on-going activities should be avoided;
- Due consideration should be given to the fact that the capacity of the government is too limited to implement or continue a program/project only by itself;
- Effective coordination should be facilitated to maximize the effect of interventions.

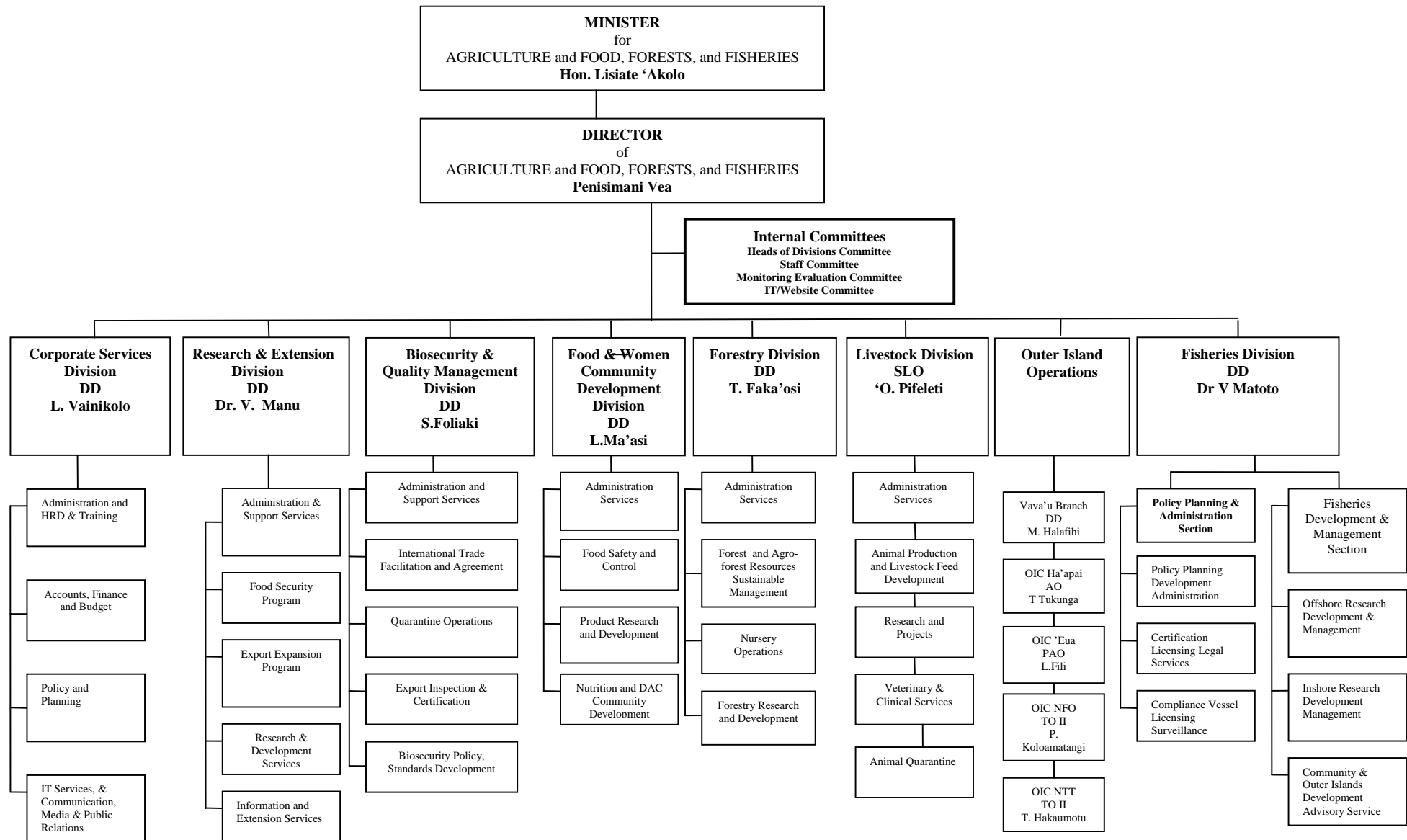


Figure 6.1 Organizational Structure of Ministry of Agriculture, Food, Forests, and Fisheries

(Source: Annual Management Plan of MAFFF 2009)

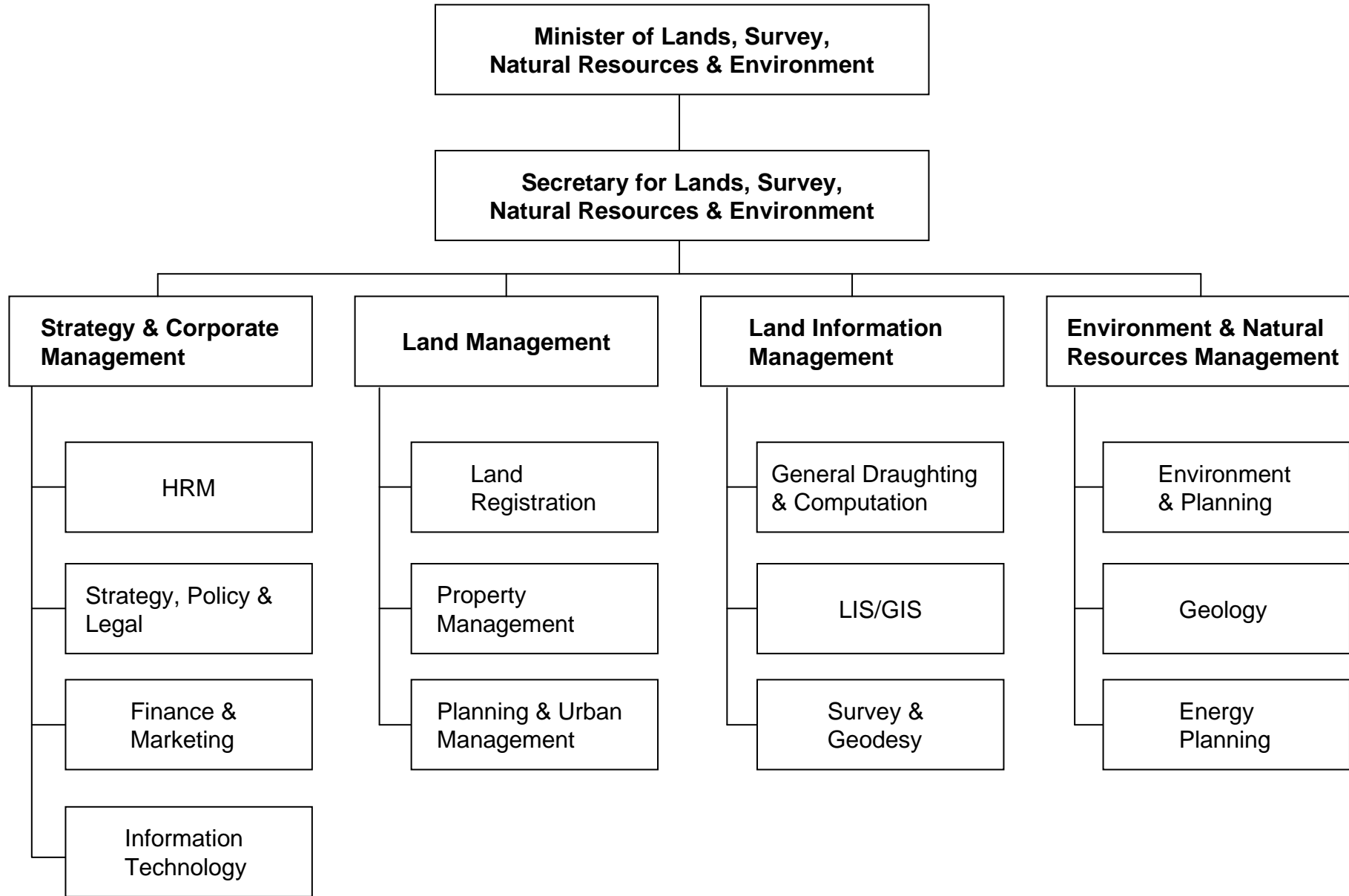


Figure 6.2 Organizational Structure of the Ministry of Lands, Survey, Natural Resources & Environment
 (Source: Corporate Plan of MLSNRE 2007-2009)

Table 6.1 Potential Interventions/Programs relating to “Conservation of Forest Ecosystems and Environmental Monitoring”

No	Needs	Possible interventions	Type of measures	Potential target sites	Related projects	Possible JICA Scheme	Relevance to polices	Relevance to climate change	Necessity	Urgency	Priority
1	Baseline data of forest and mangrove resources	Establishment of a database or an inventory of the existing forests and mangroves in the country using GIS and satellite images with ground truth surveys (This can be combined with the activities of Nos. 2 and 3.)	Mitigation	-	SLM Adaptation to Climate Change in Pacific Island Region	Technical Cooperation Type Project on a regional level in combination with allocation of JOCV	High	Medium	High	Medium	Medium - High
2	Sustainable forest management in the remaining forests	Assistance in the preparation and implementation of a forest management plan of the remaining forests in Eua Island (forest mapping by using GIS, preparation of a forest management plan based on Code of logging practice, assistance in monitoring of forest management activities of TTL, etc.) (This can be combined with the activities of Nos. 1, 3 and/or 7.)	Mitigation / Adaptation	Forests in Eua	Forestry Code of Logging Practice	Development Study in combination with allocation of JOCV	High	Medium	Medium	Medium	High - Medium
3	Proper watershed management for water supply to residential areas	Assistance in the preparation and implementation of a management plan of the watersheds of water sources for water supply system in Eua (mapping by using GIS, preparation and implementation of a reforestation plan, assistance in conversion of forest from mono coniferous forest to mixed forest of broad-leave and coniferous forest, etc.) (This can be combined with the activities of No. 1 and/or No. 2.)	Mitigation / Adaptation	Eua Plantation	Water Supply Project in Eua (NZ Aid) SLM	Allocation of SV and/or JOCV	High	High	Medium	High	High
4	Rehabilitation of Mangroves and littoral forests	Assistance in rehabilitation of mangroves and littoral/coastal forests to protect the lands from erosion during high tide or to protect farms/houses from salt spray and strong wind during cyclone This intervention should be carried out together with other mitigation measures, such as construction of sea walls. Hence, it should be implemented in the part of a disaster management program.	Adaptation	Coastal areas in Tongatapu and Ha'apai Perimeter of lagoon in Tongatapu	NZAID (before) Technical Cooperation Type Project for Mangrove Rehabilitation in Bali (JICA)	Technical Cooperation Type Project or Development study for disaster management for Disaon in combination with allocation of JOCV	Medium	High	High	Low - Medium	Medium

No	Needs	Possible interventions	Type of measures	Potential target sites	Related projects	Possible JICA Scheme	Relevance to polices	Relevance to climate change	Necessity	Urgency	Priority
5	Promotion of tree planting in tax allotments	Assistance in promotion of agroforestry development (e.g., wind break forest, introduction of fruit trees, establishment of farm forest, etc.) by piloting several agroforestry models in pilot villages, collection of traditional and/or existing agroforestry knowledge and practices, establishment of a database of agroforestry techniques, and public awareness raising.	Mitigation / Adaptation	Tongatapu, Eua, Vavau islands	SLM (UNDP) National Master Plan for Agroforestry (NZAID in 1999)	Allocation of SV or JOCV	High	High	Low	Low	Medium
6	Control of Invasive species	Enhancement of capacity in controlling the invasive species through implementation of a pilot project on control of invasive species and sharing of information on and experience in controlling invasive species in other pacific islands.	Mitigation / Adaptation	National Park or National Reserve	SPREP UNDP	Tech. Cooperation Type Project on a regional level	Medium	Medium	Medium	Low - Medium	Low - Medium
7	Management of national parks	Assistance in review and revision of the existing management plans of the national parks and implementation of the revised management plans	Mitigation / Adaptation	Eua, and other islands	SPREP PoWPA	Allocation of SV or JOCV	Medium	Low - Medium	Medium	Low	Low

7. Solomon Islands

7.1. General

7.1.1. Location and population

Solomon islands extends from E 156°23'to E 168°48', N 6°35'to N 12°18'in the southern pacific ocean. Other than the main islands such as Guadalcanal, Malaita, Santa Isabel, San Christobal, Chouseul, there are around 1,000 small islands in the country. Total population is 524,000 (Census in 2004) and Malaita island has the largest population. The whole country is divided into nine provinces based on the main islands. There are more than one hundred and twenty local languages in the country and people belonging to different ethnic groups are communicating using the Pidgin language which was created mixing the local languages and English.

7.1.2 Land ownership

In Solomon islands, more than 85% of the land are held by the local community based on their customary rules. The customary land tenure is widely reported in the tropical developing countries but what is distinct in the Pacific Islands is that there are several "land owners" on a piece of land. This is frequently revealed at the time of land allocation to the investors who intends to launch some projects. According to the rules of the community, the investors usually have to pay the compensations to each land owners, which costs several times than the cases in the counties outside of the Pacific Islands. This gives some experts the basis to claim the customary landownership hinders the rural development projects brought about by the outside individuals or the companies. The government intends to formulate the policy, laws and regulations to give clearer legal basis to the customary land ownership to enable more easily the land acquisitions like the cases in the registered land in the township area.

7.2 Present condition of forest ecosystems

7.2.1 Forest and its exploitation

The natural forests in Solomon Islands amounts 2.2 million ha. Among them only small part of natural forests are suitable for logging of high valued trees because most of the natural forests in this country are located on the very steep slopes. The livelihoods of rural people are largely dependent upon the products from the natural forests. Furthermore the logging operations in the natural forest are going on with high speed, which explore in average 14,000 ha/year in the country. It is producing 550,000 m³ of round woods and exports them mainly to the Asian countries.

The sustainable level of logging per year is 220,000 ~ 330,000m³/year, which means the current pace of logging is more than two times than that. Today it is widely understood that keeping the current pace of logging will exhaust all the timber woods in the forest before 2010. The high valued timbers

in the natural forest in Malaita islands were exhausted already after the thorough exploitation taken place since 1990s'. Meanwhile the government has started efforts to recover the forest vegetation and timber production through national reforestation project allover the country. Around 30,000 ha of plantations were established in the provinces.

7.2.2. Impacts of the climate changes

The extensive logging with the speed more than three times than the sustainable level relates to the impacts of Climate Changes in Solomon Islands. After the logging of high valued timber tree, the canopy layer gets to be sparse, abandoned forestry and working roads for the harvester extend on a steep slopes and invasive species spread in the opened areas. Under such conditions, the logged forests become more vulnerable to the impacts of the Climate changes such as storm and strong cyclone.

Excessive logging is widely operated in the country until the expiration of concessions which were already issued by the Ministry of Forestry. It is supposed to be end between 2012 and 2014. Meanwhile the Ministry just started in 2008 to develop the plantation of Teak and Mahogany targeting all provinces but it is supposed to take at least another 25 years until the first harvest of these timber woods. During this period, the logged forests are also under the process of vegetation recovery. Therefore in the next twenty to thirty years, the forests and plantation would be most valuable to the adverse effects of the climate changes.

7.3. Relevant policies and regulations

7.3.1 Policy and strategy relating to the forest and biodiversity conservation

(1) Medium Term Development Strategy (MTDS 2008 – 2011)

The Government of Solomon Islands and MCDAP formulated the “Medium Term Development Strategy 2008-2011” (Hereafter called the Strategy). The Strategy regulated the objectives, activities and outputs in the forestry sector in accordance with the overall goals. The forestry sector has four programs to address the climate changes. Followings are the summary of the objectives, activities and outputs.

Programs related to the climate changes in the Forestry Sector in the Strategy

Objectives	Activities	Outputs/outcomes
B.5.4.3. Forestry Institutional Strengthening and Capacity Building Program		
<p>National Objective : Ensure the sustainable utilization and conservation of natural resources, protection of the environment and successful adaptation to climate changes</p> <p>Sector Objective : Build a respected, professional agency to sustain and maintain</p>	<ol style="list-style-type: none"> 1. Carryout logistical and other trainings for skill development 2. Construct staff residential and office accommodation in the Provinces 3. Install information communication and technology (ICT) systems 	<ol style="list-style-type: none"> 1. A core of competent trained staff with adequate numbers and commitment to implement forestry policies and enforce regulations 2. Required quantity and quality of infrastructure, equipment and support services available at appropriate nationwide

Objectives	Activities	Outputs/outcomes
the natural resource and Environment	and equipment and establish a central, web accessible database on SI Forestry	locations. 3. Improves capacity to develop and implement policies and programs
B.5.4.4. Forestry Conservation Management Program		
<p>National Objective : Ensure the sustainable utilization and conservation of natural resources, protection of the environment and successful adaptation to climate changes</p> <p>Sector Objective : To conserve and maintain the natural state of the forest significance to protect environment and biodiversity</p>	<p>1. Establishment of gardens and protected areas</p> <p>2. Establishment of national forest research institute</p>	<p>1. Botanical garden, parks, conservation area, forest reserves</p> <p>2. Establishment of national forest research institute</p>

Source: “Medium Term Development Strategy 2008-2011”, The Government of Solomon Islands, March 2009

The two programs above present the establishment of gardens and protected areas as well as the institutional strengthening and capacity development. The Government of Solomon Islands has been largely behind in designating the national parks, protected areas and botanical gardens as well compared to the neighboring countries in the Pacific Islands. Although the country is quite rich in beautiful scenery and biodiversity, the total areas demarcated as the national parks or protected areas are only 2.8% of total land. Solomon Island is already famous for the precious species of wild orchid. These orchids are in some cases distributing in the forests and mountain in the rural area where there is no such a protected area or conservation forest. It is urgent to identify the area to be protected in terms of conserving the diversity of precious species. The program was formulated to address this issue.

(2) Forestry Development Strategies (2009-2013) and The Corporate Plan (2009-2014)

“Forestry Development Strategy 2009-2013” designates some of the divisions to be responsible for implementing the programs presented in the Strategy as shown in the next table.

Divisions to be responsible for implementing the programs in the Strategy

Program	Division
B.5.4.3. Forestry Institutional Strengthening and Capacity Building Program	Forest Resource Management and Technical Service Division Staff Corporation Service Division
B.5.4.4. Forestry Conservation Management Program	National Herbarium and Botanical garden Division

Source: The Corporate Plan 2009-2014, Ministry of Forests

Ministry of forestry collaborating with Aus AID issued “Forestry Sector Overview-Challenges and Opportunities within the Solomon Islands Sector” to provide mid-long term perspective on the development of forestry sector in the Solomon Islands. The Ministry estimated that the harvest from

the natural forests marks the highest in 2009 (1,600,000m³/yr) then decline drastically down to zero in 2014. Even though the efforts to expand the plantation of teak and mahogany are done, little harvest is expected until the first cutting in 2038. Provided reforestation activity will be continued every year, 200,000 m³/yr of timber will be harvested after 2040. In order to increase the harvest from the plantation, efforts have to be done to expand the plantation continuously in the whole country. The source of timber supply will shift from the natural forests to the plantation in the coming 20 to 30 years, which is regarded as a critical period for the forestry administrations to change the mode of production from the extensive forest exploitation to the sustainable forest management including the reforestation activities.

Based on these understandings, the Corporate Plan was prepared to conduct the Strategy. The Plan presents eleven important issues in order to shift the direction of forest administration towards the sustainable forestry.

Important policy area in the Corporate Plan 2009-2014

1. Monitor and Ensure compliance of logging practices with the Code of Logging Practices as well as the Forest Resources and Timber Utilization Act
2. Monitor the extent and quality of National Resources
3. Review of all licenses to establish validity
4. Proper monitoring of shipments of round logs, international log prices and adjust Determine Value of round logs accordingly
5. Update database for both log export and licensing
6. Review the forestry quota
7. Implement the National Reforestation Program to assist local communities to do reforestation activities
8. Implement the timber milling and downstream processing program to assist local stakeholders
9. Promote and assist small scale plantation and where possible ensure reforestation of logged areas in mandatory for companies
10. Establishment and management of demonstration plots at identified areas
11. Review and enactment of the Forestry Legislations including subsidiary regulations

Source : The Corporate Plan 2009-2014, The Ministry of Forests

(3) Agriculture and rural development strategy 2007

The Government collaborating with the Ministry of Development Planning and Aid Cooperation and European Union prepared the “Solomon Islands Agriculture and Rural Development Strategy (ARDS)” in March 2007. In line with the current policy direction of rural development, ARDS shows the practical direction and policy of rural development. It propose the basic direction of rural development to promote the agricultural production and fully utilize the natural resources available in the rural area, which was formed based on one of the government policies of de-centralization of administration and decision making in implementing the program/project in the rural area. Viewing

from the wider perspective, ARDS analyzes the issues and problems of the sectors relating the rural development such as agriculture, forestry, environment, education, health care, etc.

ARDS points the priority issues to be addressed in rural development, such as 1) improvement of government services in the local community, 2) agricultural development through integrated approach, 3) management of natural resources. Among them it mentions in detail on the management of natural resources. There are three sub-items such as (1) efforts on land reform, (2) Preparing for structural changes in the forest sector, 3) management of marine resources. Further ARDS analyzes the current situation of forestry sector as follows.

Current situation of forestry sector in the connection of several countries

Current Condition	Detailed information
Forest Resources in the Solomon Islands are rapidly degrading.	Extensive over-logging is widely practiced. Annual harvest is three times of sustainable level (330,000 m ³ .yr). “Re-entry logging” damages severely the forest vegetation.
Revenue of foreign currency by selling timbers is likely continued for six to nine years more.	Forest resources are estimated to be exhausted in a few years. The harvest will be increased before the exhaustion of timber woods. Auditing in 2005 found systemic malpractice leading to major underpayment of royalties. Systematic under-reporting log quantities and fob prices
Distribution of logging revenues need revision and tighter control,	60% of goes to the logging companies. The Government receives 25% in duties and taxes. The license holder and community share remaining 15% but negotiation is unfair between holders and community.
No effective policies are enforced to address these issues.	Forest Policy Statement was issued in 2006 to address these issues but proposed Forests Act was never enacted. A revised code of logging was enacted in 2004 but never enforced due to lack of mandate and capacity.
Weak institutional capacity of Ministry of Forestry in particular for enforcement of roles and regulations	Lack of clarity in the responsibilities, inadequacy of funding, inability to effectively prosecute, lack of adequate capacity and lack of political and legal support.

Source : The Agriculture and Rural Development Strategy 2007, The Government of Solomon Islands

Based on the understanding above, ARDS lists the issues to be addressed as follows.

Issues to be addressed by the forestry sector

Period	Issues and Actions
Short to medium term (-2011)	<ol style="list-style-type: none"> 1) Strengthening monitoring of log exports and price-determination 2) Clarifying provincial responsibility in forestry service provision 3) Review incentives for and design suitable mechanisms to support smallholder plantations 4) Scaling-up successful conservation initiatives at the local level
Medium to long term (-2020)	<ol style="list-style-type: none"> 1) The development of a legal and institutional framework 2) Focus on institution-building of the provincial forest service as well as the FD within the context of passage of the Forest Act on 2004 3) Continue support for the development of plantation based on improved mechanisms to mitigate the risks for smallholders 4) Address gaps in legislation as regards resource conservation

Source : The Agriculture and Rural Development Strategy 2007, The Government of Solomon Islands

(4) National Forestry Policy Statement 2006

The Government issued National Forest Policy Statement in 2006. The Statement sets the priority forest uses as 1) to ensure the long term socioeconomic security of Solomon Islands, 2) to facilitate commercial uses of the natural forests where it is not possible to conduct the first priority. In order to realize the priority forest uses the Statement lists five key strategies as follows.

Key implementation strategies in the National Forest Policy Statement

No.	Strategy
1	To adapt a long term view of the forestry sector
2	To protect future economic forestry options as a basis for sustainable economic growth
3	To facilitate and promote increased local level participation in forestry administration, harvesting and resource replenishment
4	To provide strong support for the protection of the environment and ecological sustainability
5	To leave commercial scale plantation development and sawn timber production as decisions for the private sector to make

Source : Solomon Islands National Forest Policy Statement, 2006

(5) National Forestry Plantation Development Program

To change the policy direction “from logging forestry to plantation forestry”, the Ministry of Forestry formulated “National Forestry Plantation Development Program” (2007-2012). The Program focuses to support the local community as a main actor to implement plantation and natural forest management providing seedlings, subsidies, technical advises and monitoring of the activities. The Government allocates their budget annually for the Program. It targets all provinces in the country and 7,239 ha of plantation have been already established as of October 2008. The Ministry of Forest calls the plantation forestry “Sun rising sector” supposing it will contribute to increase the government revenue by selling the timbers from plantation in near future.

7.3.2 Laws and regulations relating to the forest and biodiversity conservation

As described in ARDS, logging operations in the natural forests are currently going on rapidly with high pace, which is supposed to deplete the forest resources several years later. Meanwhile it will take at least 25 years until the planted trees (teak and mahogany) will reach to the first harvest. Therefore based on the long term perspective, the Ministry of forestry needs to change the direction from exhaustive logging forestry to sustainable plantation forestry including reforestation in the logged area. Along with the shift of direction, some of the key laws and regulations need to be revised.

(1) Approval of Forests Bill at the parliament

The current basis of forest administration is “The Forests Resources and Timber Utilization Act (Cap 40, FRTU Act in 1969)”. Because almost 40 years have passed since this act was enforced, it has been updated and need to be revised. The purpose to enact new forests bill is to strengthen the power of Ministry of Forestry to control and supervise the logging operations in natural forest. The bill was

drafted in 2004 and discussed every year since then but never enacted until now. The Ministry is serious to address this issue. It employed the legal advisor this year to pass the bill at the parliament. But some donors contributing to the forestry sector claim it is too late to mitigate the diverse effects of uncontrolled logging because it was already conducted in the natural forests in all over the country and supposed to deplete the resources near future.

(2) The Revised Solomon Islands Code of Logging Practice

The Government issued in 1961 the Code of Logging Practice to control it from the technical viewpoint and revised it in 2002. The revised Code regulates the following items.

Key Standard Regulated in the Revised Code of Logging Practice

Number	Key Standard
1	Protected and Exclusion areas
2	Location of Roads and Landing
3	Maximum Width of Road line Clearing 40 Meters
4	The Three Rules of Road construction
5	Landing Size and Number
6	No Felling or Skidding within Buffers
7	Temporary Crossings
8	Blade Raised when Skidding
9	Skid Track Width Less than 5.5 Meters
10	Maximize Log Value and Avoid Wastage of Timber
11	Weather Restrictions to Logging

Source : Solomon Islands Code of Logging Practice 2002

7.3.3 National Adaptation Program of Action (NAPA)

As one of the members of UNFCCC, Solomon Islands formulated the National Adaptation Program for Action (NAPA) in November 2008. NAPA is a policy paper of Least Developed Country (LDC) and Small Island Developing State (SIDS) to communicate with other member countries of UNFCCC on the priority activities addressing the urgent and immediate needs and concerns relating to adaptation to the adverse effects of climate change. NAPA of Solomon Islands lists the following priority areas with the budgets supposed to be needed in implementing the activities.

Priority Areas listed in NAPA and Project Budgets

Priority	Priority Adaptation Activity	Budget (USD)
1	Agriculture and food security, water sanitation, human settlements and human health, education awareness and information	6,500,000
2	Low lying and artificially built-up islands	3,500,000
3	Waste management	1,500,000
4	Coastal protection	1,750,000
5	Fisheries and marine resources	1,500,000
6	Infrastructure development	2,000,000
7	Tourism	500,000
	Total	17,250,000

Source : Solomon Islands National Adaptation Programs of Action, The Government of Solomon Islands

NAPA of Solomon Islands puts the priority on the BHN (Basic Human Needs) issues such as agriculture and food security, water sanitation, human settlements, etc. in relation to the adverse effects of climate change. It allocates more than 30 % of total budgets to these areas. Consequently issues relating conservation of forest ecosystem and biodiversity are not included in the priority areas.

7.4 Stakeholder analysis

7.4.1 Government organizations related to the sector

(1) Ministry of Forestry

Before December 2007 the forestry sector was one of the departments under the Ministry of Forests, Environment & Conservation. The Ministry of Forestry was newly established in December 2007 by being separated from the Ministry of Environment. The current organization has four technical divisions and one administrative division as follows.

Technical Divisions:

- 1) Forest Industry and Utilization Development Division,
- 2) Forest Development and Reforestation Division,
- 3) National Herbarium and Botanical Garden Division,
- 4) Forest Resource Management and Technical Service Division

Not only supervise the timber industry, these divisions are in charge of technical development and extension, reforestation and rehabilitation of herbarium, which covers wide range of forestry sector in Solomon Islands. At the head quarter in Honiara, each division has seven to ten permanent staff whose levels are more than the certificate folders. These four divisions are supervised by the Commissioner of Forest who is the top of the technical field in the ministry.

(2) Ministry of Environment, Conservation and Meteorology

The Ministry of Environment, Conservation and Meteorology has Climate Change Division. The Division compiled the NAPA and is responsible to coordinate the ministries and departments to engage in the adaptation/mitigation measures against the climate changes and to monitor its progresses. The Ministry is in charge of designating the national parks, protected areas and forest conservation areas in the country. It received the support from the UNDP in compiling the inventory data on fauna and flora in the candidate areas for the parks and conservation areas. It is also responsible to manage the marine resource management such as coral reef and mangrove forests, which requires the RS (Remote Sensing)/GIS technologies. But unfortunately the Ministry does not have a division or unit to work for RS/GIS or technician who can operate it.

(3) Ministry of Lands, Housing and Survey

Ministry of Lands, Housing and Survey (MLHS) has a GIS unit who has technologies to produce thematic maps using GIS. Recently they started to produce the land use planning map in the Honiara township area and suburbs to show the boundaries of allocated plot for building houses to each family. They have not started to produce the land use planning and vegetation map covering the provinces or the whole country. These kind of thematic maps are to be produced according to the requests from the relevant ministries.

Interview to the Permanent Secretary of MLHS revealed that the administrative boundary were identified and fixed only in the provincial level. The boundary between the districts and villages have not fixed yet though the local people understand it according to the physical conditions (rivers, ridges of hill and mountains, etc). Most of the land in the rural area are occupied by the people based on the customary roles in each location and have not got an official registration as regulated in the land law of the Government. MLHS intend to reform the land law and conduct the land registration project covering the whole country to give the legal title to the customarily owned land so that it becomes consistent with other types of land holdings and is placed under same legal frame work of land management. The project requires huge amount of fund and so far there is no fund provided by the donors to implement it.

(4) Ministry of Development Planning and Aid Cooperation

Ministry of Development Planning and Aid Cooperation (MDPAC) is in charge of formulating the development plan of all sectors and coordinating its implementation by several ministries as well as receiving the aids and supports by the donors and international organizations. MDPAC cooperated with main donors in compiling the “Agriculture and Rural Development Strategy 2007”.

7.4.2 Donors and international organization

(1) Aus AID and EU forestry project

Aus AID (Australian Aid) started to support the forestry sector in Solomon Islands in 1995 by conducting forest resource assessment covering the whole country. Their cooperation continued formulating the forestry project titled “Solomon Islands Forest Management Project Phase I”(2000-2004) and Phase II (2005-2009). The main fields of technical cooperation are 1) Forest resource assessment using satellite images, 2) Preparation of operation map using GIS, 3) Preparation of logging plan and data management of logging practices. The Project of Phase II is now under implementation in the three components namely “Forest policy reform”, “Organizational strengthening” and “Livelihood improvement among the local people”. As a main outputs of technical cooperation, the Project compiled ”Solomon Islands National Forest Resources Inventory, February 1995” and ”Solomon Islands National Forest Resource Assessments Update 2006”.

Solomon Islands Forestry Management Project II(SIFMP II) supported by Aus AID

Goal
(1) Build capacity in Ministry of Forestry (MoF) to manage and regulate Solomon Islands forest resources (2) Engage stakeholders to maximise benefits from forest resources
Component
(1) Legal reform, (2) Organizational strengthening, (3) Rural livelihoods
Key outcomes
(1) Improved MoF senior management capacity, (2) Code of logging practice legalized, Reformed process for logging licenses, (3) Environmental compliance capability maintained, (4) Strategic information for Solomon Islands Government fiscal planning, (5) Expanded smallholder estate and improved plantation quality, better informed growers

Source: Solomon Islands Forestry Management Project II (SIFMP II), Aus AID

The Project Phase II (SIFMP II) will complete its activities in June 2009 while Aus AID is now formulating new program succeeding SIFMP II. The core concept of the new project is not forestry but “sustainable rural development” including several sectors such as agriculture, forestry, health, construction, health and education, etc. After the detailed designing process it is supposed to launch within 2009.

Since 2007 EU (European Union) implements “Sustainable Forestry Project” targeting all (9) provinces in the country. The Project consists of several independent small scale projects/activities in the central and provincial level.

EU Sustainable Forestry Project

No.	Small scale projects and activities
1	Solomon Islands Forest Conservation Strategy (Support to WWF)
2	Tetepare Island Project
3	Forest Conservation Grant Scheme
4	Landowner advocacy and legal support service (Support to PSO)
5	Solomon islands participation in a review of opportunities & constrains for verifying legal production and trade
6	Re-establishment of the national forestry school as Pietete
7	Support to Kolombangara Forest Products Ltd.(3,750 ha)
8	Trailing practical approach to harvesting and marketing of small holder woodlots
9	Trailing community based commercial scale natural forest management

Source: EU Sustainable Forestry Project, Concept Paper 2007

Small scale projects (SSP)/activities of EU Project are in line with the “B5.4.1. Sustainable Forestry Program” described in the Medium Term Development Strategy (MTDS). The modes of implementing SSP/activities vary according to the needs of support. Some SSP/activities receive support of fund to implement while others are provided fund and technical support through local NGOs. As an example of SSP, WWF received the fund from EU to conduct the “community based forest management” in Choiseul and Cristobal islands (No.1 in the table above). In this SSP, WWF and the local community agree to exchange the minutes of understanding (MoU) on the rules and

regulations to conserve and utilize the forests and woodlands located in the community. Staffs of WWF and the community members monitor the implementation of MoU.

(2) SPC’s joint country strategy

Collaborating with the Government, SPC formulated in November 2008 “Joint Country Strategy 2009-2012”. The Strategy includes aids and supports to several sectors in Solomon Islands in line with MTDS of the Government. Supports to the forestry sector described in the Strategy are summarized in the next table.

Supports to the Forestry Sector in the SPC Joint Country Strategy 2009-2012

Program Goals in MTDS	Program Objectives set by SPC Strategy
<p>B 5.4.1. Sustainable Forestry Program Increased establishment and improved management of small-scale, family owned timber plantations and commercial forestry plantations</p>	<p>Sustainable Forestry Program 1. To build the capacity of : 1) Forestry extension staff working for community forestry 2) Forestry technical staff working for establishing commercial plantation</p> <p>2. To prepare the materials e.g. documentary film, brochure, poster, and conduct extension activities in the community using those materials</p> <p>3. To draft government law to regulate establishment of plantation</p>
<p>B 5.4.2. Sustainable Forest Industries and Downstream Processing Program Increased benefits to the country, rural areas and resource owners from forestry by increasing value added through downstream processing</p>	<p>B 5.4.2. Sustainable Forest Industries and Downstream Processing Program 1. To build the capacity of the people working in the forest industries 2. To conduct marketing for the products harvested from agroforestry fields 3. To review and revise the current law and regulation on forest resource utilization 4. To enforce code of logging practice and forest certification</p>
<p>B 5.4.4. Forestry Conservation Management Program To conserve and maintain the natural state of the forest significance to protect environment and biodiversity</p>	<p>B 5.4.3. Forestry Conservation Management Program 1. To build the capacity of staff in the herbarium 2. To establish the protected area 3. To build the capacity of forestry staff working for rehabilitation of forest land 4. To support enforcement of national strategy and action plan on management and utilization of forest gene resources</p>

Source: “Joint Country Strategy 2009-2012”, Solomon Islands and SPC, November 2008 SIG approved.

(3) Forestry Project by other NGOs

WWF (World Wildlife Fund) formulated their strategy to support the forestry sector of Solomon Island which is titled “Solomon Islands Forest Program”. Under the strategy WWF implements participatory forest conservation projects in Choiseul Island. In this project WWF prepared the MoU on the conservation of forest and woodland and exchanged it with the local community. The rules and regulations described in MoU are based on the customary rules practiced among the community. Because the current Forestry Act does not regulate the community-based forest management, the

MoU exchanged between WWF and the community are not authorized and do not have any validity in accordance with the current law. Conservation International (CI) also implements the same project in Cristbal Islands.

7.5. Needs assessment

7.5.1. Policy direction in relation to combating climate changes

(1) Establishment of Protected Area

Compared with other pacific islands countries, Solomon Islands is behind in administration of national parks and protected areas. Although it is quite rich in natural environment and precious fauna and flora, total area of national park (1) and protected area (3) reaches only 2.8% of the land area in the country. Supported by UNDP in 2008, the Ministry of Environment, Conservation and Meteorology conducted the survey of ecosystem in the proposed sites for the protected area. It will be deliberated in the board of committee of the Ministry for further approval on designation of new protected areas.

(2) Progress of the Reforestation Project

The Government has started the reforestation project (national Forestry Development Program 2007-2012) targeting all the provinces in the country. The main actors are the local people who own their forest land in the community. The government, the provincial forestry offices offer the people the seedlings, technical advices and subsidiaries if needed. The main tree species planted are Teak and Mahogany which have high market value for export. The average cutting cycle is twenty five years. As of October 2008, 7,239 ha in total were planted by the small holders in the local community. Most part of the budget are allocated from the general budget of the government.

(3) Reformation of Ministry of Forestry

Before the separation of the Ministry in 2007, the duties of the Ministry of Forestry focused upon issuing the concessions for logging and collecting the taxes from the logging company. After the independence from the Ministry of Forestry, Environment and Conservation, The Departments and Divisions were reformed to address broad issues in the forestry sector, namely setting up the following four technical divisions. Aus AID has supported all divisions until 2009.

7.5.2 Potential interventions required

(1) Needs for cooperation

Through the analysis on the collected information the main issues to be addressed in Solomon islands are summarized as follows. The requests presented by the Ministry of Forestry are as follows.

- 1) Rehabilitation of the National Herbarium and botanical garden in Honiara city. Inventory survey of the precious/useful local plant species and study to utilize them

- 2) Forest resource assessment using the latest satellite images and preparation of forestry operational plan
- 3) Financial support to small scale plantation by the local people and study/extension of new silvicultural techniques
- 4) Capacity building of forestry staff in silvicultural engineering and administration

These items above are further sorted and summarized to be the needs of the forestry sector in Solomon Islands by adding the information and comments of the personnel expressed in the interviews.

- 1) Technical cooperation in changing direction of forest policy and administration from logging forestry toward plantation forestry : (1) Development and arrangement of forestry information system using latest satellite images and RS/GIS and preparation of sustainable forest management plans using the system, (2) Development of silvicultural technology to rehabilitate degraded natural forest and its extension
- 2) Technical cooperation in conservation/utilization of local tree species in Solomon Islands: Resource assessment of local plant species and identification of precious /useful plants. Study to utilize those plants and their extension
- 3) Training of forestry staff to build their capacity in silvicultural engineering and forestry administration

(2) Proposed projects

Special attention should be paid to the following points when formulating the program/project in the forestry sector in Solomon Islands

- 1) Cooperation/Coordination with Aus AID : Aus AID intend to start new program in 2009 to cover broad area in the rural development. Because they will not commit to the forestry sector any more, they basically welcome the Japanese ODA to start the project in the Ministry of Forestry. They only hope the JICA's project will consistent with their rural development program. Furthermore, their program may be partly related to the "Rural Development Model Program" which the Solomon Islands JICA office is now formulating. It is needed to continue dialogues with Aus AID to coordinate the implementation of those programs.
- 2) "Step by step" approach : The Japanese ODA has never cooperated the forestry sector in Solomon Islands. In order to be acknowledged steadily in this sector, "step by step" approach is recommended, that is to start with implementing the high priority project (National Herbarium rehabilitation) to get clear outputs/outcomes, then to launch other projects such as technical cooperation in forestry planning and silvicultural engineering and study and extension of new plantation technologies.

Considering the strategies above, following three projects are proposed.

- 1) Inventory survey of precious/useful plants and study on their utilization and extension : Adaptation measure. This is technical cooperation in conducting the survey, study and

extension activity on the precious/useful local plants in Solomon Islands. Because the outputs could be used and/or applied in other pacific islands countries, it may be formulated as a part of the regional program on study and utilization of local plants in the pacific region.

- 2) Rehabilitation of National Herbarium and Botanical garden in Honiara : Adaptation measure. This is combination of grant aid (rehabilitation) and JOCV/JOSV dispatch. Since the ethnic tension took place in Solomon Islands after 2000, all specimens and samples of indigenous plants collected in Solomon Islands were evacuated to the herbarium of the University of Southern Pacific (USP) in Fiji. The Ministry of Forestry intends to take those specimens back to the Herbarium to develop and enrich the intellectual property of the country. This project was proposed to the Government in 2008 as a first priority in the forestry sector.
- 3) Development of forestry information system and preparation of sustainable forest management plan : Adaptation/mitigation measures. This is technical cooperation in developing the forestry information system using the latest satellite images and RS/GIS technology to formulate, implement and monitor the sustainable forest management plan. Introducing the latest satellite image in forestry planning is common issue to the pacific island countries, which may be appropriate to formulate the regional program and country wise project.

Table 7.1 Potential Interventions/Programs relating to “Conservation of Forest Ecosystems and Environmental Monitoring”

No.	Development Needs	Possible interventions	Type of Measures	Potential target sites	Applicable JICA's Schemes	Related Donors	Relevance to NAPA	Relevance to policies	Necessity	Urgency	Priority
1	Inventory Survey and study on rare/useful plants	Inventory survey of rare plants in the target areas Study on culture, raising of seedlings, utilization on rare/useful local plants Proposal on new protected/conservation areas based on the findings of local plants	Adaptation	Whole country	T/A by regional project Dispatch of JOCV/JOSV	NIL	Low	High	High	Medium	Medium - High
2	Rehabilitation of national herbarium and botanical garden in Honiara	Rehabilitation of old building of national herbarium Rehabilitation of botanical gardens adjacent herbarium Promotion of understanding on the rare/useful local plants	Adaptation	National herbarium in Honiara	Grand aid and dispatch of JOCV/JOSV	NIL	Low	High	Medium - High	High	High
3	Development of forestry information system and preparation of sustainable forest management plan	Development of silvicultural techniques using indigenous tree species Assessment of forest resources using the satellite images and ground survey Preparation of sustainable forest management plan based on the analysis of forest resource assessment Technical and institutional arrangement for promoting small scale plantation by the local community	Adaptation	Whole country	T/A by regional project Dispatch of Expert or JOCV/JOSV	AUS Aid	Low	High	High	High	High

8. Republic of Kiribati

8.1 General

8.1.1 Location and population

The area of the Republic of Kiribati extends in the southern Pacific oceans with the distance of 2,000 km from east to west including the Gilbert islands, Phoenix islands and a part of Line islands. It is surrounded by the small Pacific countries such as Marshall islands, Solomon islands, Samoa, Cook islands. Kiribati has the third largest area of ocean in the world. The total area of the country reaches 3,500,000 km². Meanwhile the land area is only 730 km², which counts only 0.02% of the total area. Around 90,000 people live in the 23 small atoll islands making their livelihoods by cultivating coconut palm, tree crops, taro and fishing in the ocean.

8.1.2 Land ownership and land use

According to the Land Use Planning Ordinance there are the land use planning in some areas in the centre of south Tarawa area where the lands are allocated for the government buildings and public facilities. Other than these cases the lands are occupied or owned by the rural people based on their customary rules and practices. The major land use is agriculture (50.7 %) in which 10% of total population are engaging. Because the soils contain much of the calcium, it is not suitable to grow the rice and vegetables. The root crop such as swamp taro and giant taro and tree crops e.g. bread fruit tree, coconut palm, pandanus trees, etc. are the major staple food crops in Kiribati. Further more the coconuts palm are planted and grown densely around the houses and in the bushes to export its fruits (copra) to the external market.

8.2 Present conditions of forest ecosystem

8.2.1 Forest and its distribution

According to the Forest Resource Assessments by FAO, there are 2,000 ha of natural forests, which amounts 2.7 % of the total land area in the country (73,000 ha). However the staff of the Environmental Conservation Division said the forest reported in the Assessment is actually the woodlots of coconuts palm, bread fruit, pandanus, which are not exactly the same as the forest defined by FAO. The Environmental Conservation Division and FAO have not agreed yet each other on how to re-define the woodlots in the islands in Kiribati.

The forest inventory survey has not been done in the outer islands because it is too difficult to access to these islands, which means the natural vegetation in those islands have not been identified yet. In general these islands are isolated from the main islands of the continent and the local people heavily depended on the natural resources in their islands. Therefore most of the vegetations in the islands have been disturbed to some extent, which implies there might be no intact forests which form the high canopy

layer by the tall trees. Meanwhile various sizes of mangroves distribute mosaic in the coastal area in the most of the islands in Kiribati. Likewise the woodlands in the islands, these mangroves have also been cut, and disturbed by the people to various extents in the past. The relatively intact mangroves remain only in the some parts of outer islands where the impact by the human activities are more or less smaller than in Tarawa islands.

This Study focuses its proposed activities only in Tarawa islands. The outer small atoll islands are excluded from the target because they are extremely far from the main islands in the Tarawa area and it is not realistic to formulate the project to support the government staff in those remote islands. In this sense as already discussed above, we can conclude that there is not a forest in Kiribati though some 2,000 ha of forest are reported in the assessment report compiled by FAO.

8.2.2 Local tree crops

Looking at the level of each tree/grass species, we can understand that there are various indigenous tree/grass species utilized by the local people as their daily staples, traditional medicines, domestic utensils and construction materials. The ethno-botanical survey revealed more than 300 local plants were identified and used in specific purposes in the peoples' lives in atoll islands. Among these local plants, the tree crops providing the staple foods as well as being sold in the market are important ones and identified by the local names in several different islands in the country. Among these species some of them are the sub-species which were adapted in the local environment in the atolls with the expansion and immigration of humans in these atoll areas several hundreds years ago. The scientific knowledge shows the coconuts palm and bread fruits tree are originated in the pacific island areas then gradually expanded in the tropical regions.

Local Names of Coconut Palms and Bread Fruits Trees (In local dialect of Kiribati language)

General Name	Scientific Name	Local Name
Coconut Palm	<i>Cocos Nucifera</i>	Ni, Nii – Te ari uaai, Nii- Te tina n nii, Nii bubura, Nii bunia, Nii-Nei Tebee, Nii ni benu, Nii ni ngaun, Nii rinano, Nii roro, Nii uraura, Nii wae, Nii-Nei Mori
Bread fruit tree	<i>Artocarpus altilis</i> , <i>Artocarpus mariannensis</i>	Mai-Bukiraro, Mai kora, Mai-Motiniwae, Mai bokeke, Maikerang,

Source : Kiribati Country Report to the Conference of parties (COP) of the Convention on Biological Diversity (CBD), 2007, Ministry of Environment, Lands and Agricultural Development

The field survey in the mid Tarawa islands reveled that the area where people settle are quite limited in most atolls. The settlement is generally composed of five to ten houses (small huts) which are surrounded by the planted/naturally generated coconuts and pandanas trees. Under the coconuts

palm canopy, taros are grown in some locations. The government staff attended in the survey explained this is the typical land use in the atoll islands. There are neither rice fields nor vegetable gardens.

8.2.3 Impacts of the climate changes

The survey has not been conducted yet to grasp the impact of the Climate Changes in Kiribati. Therefore the statistical information on this issue has not been available so far. But the interview to the government personnel and aid agencies gave some partial information, those are;

- 1) Coconuts palms are damaged and died in some locations in outer southern atolls by the incursion of saline water from the ocean,
- 2) The precipitation is getting unstable year by year resulting in the shortage of water for domestic uses in south Tarawa.

To address this KAP 2 Project is supporting the people in Tarawa islands 1) to facilitate the water tank in the households, 2) to dig a well and survey the ground water.

8.3 Relevant policies and regulations

8.3.1 Policy and regulations relating to the forest and biodiversity conservation

(1) Kiribati Development Plan 2008 – 2011

The development policy of Kiribati is provided in the “Kiribati Development Plan 2008-2011” (Hereafter called the Plan). The Plan regulates six broad priority issues.

Priority Issues in the Kiribati Development Plan

- | |
|---|
| 1 . Human Resource Development |
| 2 . Economic Growth and Poverty Reduction |
| 3 . Health |
| 4 . Environment |
| 5 . Governance |
| 6 . Infrastructure |

Source : Kiribati Development Plan 2008-2011, Government of Kiribati

Among the broad priority issue, the environment is listed as the fourth priority issue. The government policies in the environmental sector in Kiribati are planned and conducted by the Ministry of Ministry of Environment, Land and Agricultural Development (MELAD) which take in charge of environment, land management and agricultural development. Therefore the environment listed in the Policy includes the land and agriculture policy as well as environment. The Priority areas in the environment are as follows.

The Priority Areas mentioned in the Plan

Issue	Strategy
Protection and replenishment of natural resources	<ol style="list-style-type: none"> 1. Encouraging replanting of both staple food crops and other native plants 2. Ensure and maintain protection and conservation of agricultural and marine resources 3. Develop and promote ecotourism
Protection of islands biodiversity	<ol style="list-style-type: none"> 1. Ensure and maintain protection and conservation of threatened islands biodiversity 2. Encourage and promote use of staple food crops, traditional herbal medical, cultural and other important native plants/trees 3. Implementation and enforcement of the Environment Act and regulations 4. Prevent the introduction of dangerous foreign species 5. Establish and formalize the national Environmental Advisory Committee 6. Develop and promote ecotourism 7. Strengthen the Wildlife Conservation Ordinance 8. Encourage and Promote community participation
Improve national capacity to effectively respond and adapt to climate change	<ol style="list-style-type: none"> 1. Enhance national climate change information repository and dissemination 2. Carry out research, systematic observations, and reporting in accordance with requirements 3. Increase awareness activities on climate changes 4. Implement and provide training on resource management systems to enhance collective role of all sectors for adaptation and mitigation 5. Formulate and implement national adaptation frameworks, e.g. NAPA, extension of KAP II, etc. 6. Formulate and implement mitigation plans and strategies, e.g. Energy, Policy, etc.

Source : Kiribati Development Plan 2008-2011, Government of Kiribati

As for “protection and replenishment of natural resources, the plan regulates to conserve the species diversity through growing the indigenous useful plants and to maintain the agricultural resources such as land and plants seeds. Recently people tend to depend more and more on the imported foods such as rice, corn and flour, which the government thinks threatens the food security in the country. The multi-faceted activities are listed to conserve the islands biodiversity, such as to promote to utilize the local plants and control the invasive plant species, implementation and enforcement of environmental acts, establishment of environmental committee, promotion of ecotourism, participation of the communities in the conservation activities. To improve national capacity to effectively respond and adapt to climate change, the Plan regulate to enhance management systems in information gathering, reporting, research and extension activities. MELAD prepare the Ministry Operational Plan (MOP) to implement these activities listed above.

(2) National Biodiversity Strategy and Action Plan

The National Biodiversity Strategy and Action Plan, 2006-2010 was formulated in to implement the strategies regulated in the Plan in the planed period. Actually the Strategy was prepared based on

the “National Development Strategy 2004-2007” which was prepared prior to the Plan but it is still effective to be implemented. The Action Plan presents the goals of the Strategy in the five years from 2006 to 2010.

Goals of National Biodiversity Strategy

1. Improvement of informal education and public awareness at local community levels
2. Sustainable use and management of land and terrestrial resources
3. Biological resources shall be enhanced, used and managed to maintain biological diversity in the short and long term run
4. Available data and information on national biodiversity shall be expanded and made available to policy makers and the public
5. Activities that pollute and threaten biodiversity shall be minimized.

Source : National Biodiversity Strategy and Action Plan, 2006-2010, MELAD

The Action Plan analyses the issues and setbacks to affect the implementation of the Strategy as follows.

Issues and setbacks pointed by the Strategy

1. Low level of willingness of grassroots people on biodiversity
2. Low level of understanding and knowledge on the biodiversity
3. Population increase and changes of lifestyle
4. Low level of budgetary allocation and integrating environmental and biodiversity issues into National Development Strategy
5. Change over of staff, who are members of the Steering Committee
6. Several members hardly appeared in the meeting

Source : National Biodiversity Strategy and Action Plan, 2006-2010, MELAD

The Action Plan was put into practice from 2006 by the Environment and Conservation Division of MELAD. Then the country report on the Conservation of Biodiversity was submitted to the conference of parties of the Convention on Biological Diversity. The country report shows more clearly the directions to implement the Action Plan in Kiribati. It points in the chapter 3 that the following four conditions are requisites to attain the goals of the Strategy, those are 1) Information dissemination and extension activity, 2) arrangement of policy, law and regulations, 3) encouragement of peoples’ participation, 4) creation of incentive for the participation.

(3) Laws and regulations on environment

The Government of Kiribati regulated the Kiribati Environment Amendment Act in 2007. This act were constituted by incorporating the existing Environment Act (1999), Wildlife Conservation Ordinance and Recreational Reserves Act 1996, regulating the conservation of the biodiversity and the management of the protection area and world heritage. Furthermore, the Wildlife Ordinance (1977) regulates the protection of indigenous birds and turtles. This Ordinance is not applied to the wild plants and sea fishes.

The Land Planning Ordinance regulates the land use planning in three locations in south Tarawa Islands such as Betio, Bairiki, Bikenibeu. The Makin and Christmas Islands has also their land use planning stipulated by this ordinance.

8.3.2. National Adaptation Program of Action (NAPA)

Kiribati has become one of the members of UNFCCC. As a member, the Government of Kiribati prepared the National Adaptation Program of Action (NAPA) in 2007. NAPA is a policy paper prepared by the LDC countries to request for immediate aids and supports by the members of UNFCCC council against various impact of the climate changes. NAPA of Kiribati shows its emergent areas to be addressed against the climate changes are; 1) water resource management and dig of well, 2) management of coastal area, 3) Update and management of information on climate changes, 4) Enhancement of project management, 5) Rehabilitation of meteorological agency, 6) Development of agricultural crops, 7) Conservation of coral reef, 8) Erosion control of coastal area and causeway construction in the outer area, 9) Participation in the regional and international forum on climate change. Some of these issues can be summarized as they are close to the socioeconomic activities those are 1) water resources management and 2) Coastal management. These two issues are today most closely related to those happening in Tarawa islands and ranked as top priority to be addressed.

Unlike these, the issues related to the ecosystem conservation and biodiversity conservation are not included in the list of NAPA. The tree crops such as breadfruits tree and pandanas are threatened to extinction. However the biodiversity in Kiribati as a whole have not been investigated yet and because of insufficient information, it is not that the reason of threat can attribute to the symptoms of the climate changes such as sea level rise, unreliable rainfall and rise of temperature. As a consequence the ecosystem and biodiversity conservation are supposed not to be included in the priority areas of NAPA.

8.4 Stakeholder analysis

8.4.1 Government organizations related to the sector

(1) The President office and the Ministry of Finance and Economic Development

The Climate Change Issue covers several sectors in the government, which requests the President Office to supervise all the activities taking place and their monitoring in the different sectors. The permanent secretary of the Office, Mr. Betarin Rimon is taking in charge of this. He was a former officer of aid coordination in MELAD and has enough experiences to coordinate the government programs and the project activities supported by the donors. The office of national economy planning in the Ministry of Finance and Economic Development is responsible to update and monitor the implementation of Kiribati Development Plan. These government offices are the keys

in collecting the information and discussing with the staffs on the climate changes adaptation in Kiribati.

(2) The Ministry of Environment, Land Management and Agricultural Development

The environment administration in Kiribati is conducted by the Ministry of Environment, Land Management and Agricultural Development. As its name shows, it has three divisions such as 1) Environment & Conservation Division (ECD), 2) Agricultural Development Division, (ADD), 3) Land Management Division(LMD). These three divisions are mutually independent and do not have regular cooperation in their routine works. ECD takes in charge of the administration of ecosystem conservation and environmental monitoring. ECD has 34 staff in 9 sections.

Sections and number of staff in ECD (Except administration section)

Section	Number	Section	Number
Media & public awareness	2	Climate change	3
Biodiversity conservation	2	Project & finance	4
Development & control	2	Wildlife & conservation	2
Environment Inspection	8	Park management	2
Pollution control	2	Total	34

Source : JICA Study Team, April, 2009 * Christmas island base

As shown in the table above each section has only two to three people. The human resources are quite limited in each section. Considering the capacity of ECD, we have to think over to target all divisions in the ECD.

8.4.2. Donors and international organizations

(1) KAP 2 (Kiribati Adaptation Project 2) supported by the World Bank

The World Bank supports the fund to the Kiribati Adaptation Project 2 to address the issues of Climate Changes. The main activities focus upon the water resource management while some funds are provided to the rehabilitation of mangroves around the south Tarawa islands. The Environment and Conservation Division of MELAD implements the rehabilitation. It will be continued until 2010.

(2) Aids and supports by the donors

SPREP and UNDP have been supporting to the Government of Kiribati in preparing the policy papers and some field activities. UNDP recently provided the fund and advisory services in formulating “National Biodiversity Strategy and Action Plan”. SPREP provided the fund to MELAD to monitor the activities of MOP. In both cases, only the funds were provided or short term advisory services were offered, which is not a long term intensive technical cooperation. There is a technical cooperation by the Taiwan Chinese named “Home Garden Project”. It provides the

technical support in growing the vegetables in the home garden of the households in south Tarawa. It tries to improve soil fertility by using organic fertilizer and grow several kinds of horticultural crops in the demonstration farms. The Project has succeeded in improving the livelihood of the people participated in the activity as well, which is highly appreciated by the agricultural development division of MELAD. There is a small kiosk in south Tarawa selling vegetables and small souvenirs run by the women's groups taking part in the project.

SPC formulated the Joint Country Strategy in December 2008 which was approved by the government of Kiribati. It shows to cooperate in the field of environment but focusing only on fisheries in the marine areas.

8.5 Needs assessment

8.5.1 Policy direction in relation to combating climate changes

(1) Implementation and monitoring of MOP by MELAD

Each ministry prepared the Ministry Operational Plan (MOP) and monitor its implementation in every quarter. Currently MELAD is conducting the MOP of 2009. Followings are some of the information recorded in their quarterly monitoring report.

Implementation and achievement of MOP of MELAD

Strategy	Results of Monitoring
Promotion of growing food crops and local tree species	To produce the stamp seedlings of 20 herbal plants. They will be planted on the International Biodiversity Day. To plant 770 spc of mangrove seedlings in Nanikaai in south Tarawa. To hold community meeting on mangrove in Aranuka and north Tarawa.
Biodiversity conservation in the fragile islands	To hold the 1 st National Biodiversity Planning Conference To hold the community meeting of Community-based Protected in Aranuka, North Tarawa.
Implementation and enforcement of the Environmental Act	To hold the community meeting on the endowment at North, North Tarawa, Aranuka.

Source : MELAD MOP, Quarterly Monitoring Report of Q1/2009.

(2) Issues and problems recorded in the quarterly monitoring report

The monitoring report of MOP pointed the issues and setbacks which might give the problems in implementing the MOP.

Issues in implementing the Plan in MELAD

Section	Issues
Biodiversity	Budget constraint for promoting growing food crops and local plants Budget constraint for environmental conservation Incompletion of Park Regulation before the end of 2008
Climate changes	There is no IT specialist to set up the network system within MELAD. Incompletion of "Climate Change Web Site in Kiribati" because no IT specialist

Section	Issues
Media & public awareness	No staff work for extension activities using the vidual instruments Ineffective extension activities because of shortage of instruments and equipments.

Source : MELAD MOP, Monitoring report of the 1st Quarter 2009, April 2009

Meanwhile the monitoring report proposes the solutions for the issues pointed in the report as follows.

Solutions for the Issues in implementing the Plan in MELAD

Section	Solutions
Biodiversity & Conservation	To follow the process of approving the Park Regulations,
Climate Changes	To employ the IT specialists To update and arrange the data of environmental issues in Kiribati
Media & Public awareness	To allocate the budget to purchase audio-vidual equipmentsfor the extension To purchase of audio-vidual equipments

Source : MELAD MOP, Monitoring report of the 1st Quarter 2009, April 2009

8.5.2. Potential interventions required

Considering the comments of MELAD and JICA/JOCV coordinator, the following two interventions are proposed. The details are shown in the attachments 8.

- 1) Support to prepare the audio-visual education programs on the utilization of local plants and biodiversity conservation: Adaptation measures. This aims to inherit the local knowledge on important indigenous plant species among the several generations as well as disseminate the information on climate changes and conservation of environment relating to the people's daily lives in atoll islands. The JOCV(Japan Overseas Cooperation Volunteers) or JOSV (Japan Overseas Senior Volunteers) who has audio-visual expertise will be dispatched to support the media and public awareness and other relating sections in Environment and Conservation Division in MELAD to make the video program of the topic. To make sure the sustainability of the project, the JICA expert based in SPC in FIJI supports the activities of JOCV/JOSV in Tarawa. The project includes the pilot activities to show the video program on conserving local plants and environmental conservation as a whole.

- 2) Support to set up the IT systems and data base in MELAD : Adaptation measures. The climate change section in the Environmental Conservation division is responsible to collect the updated information and disseminate them to the communities. However the section could not fulfill its duties because the IT systems and the data base in MELAD have not been established yet. The section also has a responsibility to start up the "Kiribati climate change web site", which has not been uploaded yet because of lack of IT expert. In this circumstance it is an urgent issue to dispatch JOCV or JOSV to set up the IT, data base and web-site. The term of dispatch is supposed to be short (three to six months) then it will be renewed according to the progress of works and needs of further supports.

As mentioned in the previous chapter, all kinds of resources for the development are basically limited in Kiribati. Therefore it might not be realistic to assume a development study, project type cooperation, grant aid independently. Rather the cooperation of JOCV/JOSV and JICA Expert in the frame work of the “regional program” formation. The JICA expert is based in SPC in Fiji taking in charge of supporting the audio-visual education in the pacific countries. By this way it will be easier to make sure the foundation of the project by securing the fund of the project which makes it more sustainable will sustain even after the project completion. The survey schedule, records of interviews and its list are attached at the end of this report.

Table 8.1 Potential Interventions/Programs relating to “Conservation of Forest Ecosystems and Environmental Monitoring”

No.	Development Needs	Possible interventions	Type of Measures	Potential target sites	Applicable JICA's Schemes	Related Donors	Relevance to NAPA	Relevance to policies	Necessity	Urgency	Priority
1	Preparation of the audio-visual programs for the extension activities on biodiversity conservation	Selection and preparation of materials for the program Selection and procurement of audio-visual aids (video, projector, screen) Making of the scenarios for the program, filming, editing Making of extension plan using the program Trials to show the program to the communities	Adaptation	MELAD	Dispatch of JOCV/JOSV Technical support by the regional project	NIL	Low	High	Medium	Medium	Medium - High
2	Set up of the IT systems and data base of MELAD	Review of the existing data and design of the data base Instruction of data input Preparation of users manual on updating and utilization Making of the climate change web site of Kiribati	Adaptation	MELAD	Dispatch of JOCV/JOSV	NIL	Low	Medium	High	High	High

Annex

Preparatory Study on the Program for Climate Change in the Pacific Islands
(Conservation of Forest Ecosystem / Environmental Monitoring)

【List of the Projects】

Country	Project	Scheme	Implementation
PNG	1-1) Forest inventory using satellite data (Mitigation)	Technical cooperation: 3 years, Loan and TA (grant):7 years	Country wise
	1-2) Development Study on Participatory Forest Management Project (including AR-CDM) (Mitigation)	3 years for formulation of reforestation master plan and pilot project 2 years for implementation of the pilot project	Country wise
	1-3) Activation of forestry research and education(Adaptation)	Technical cooperation: 10 years	Country wise
	1-4) Survey and research on biodiversity (Adaptation)	Technical cooperation: 5 years + a	Country wise
	1-5) participatory management of mangrove forest (Adaptation)	Technical cooperation: 5 years, or Development study: 3 years	Country wise
Banuatu	2-1) Forest inventory and formulation of forestry planning	Development study: 2 years	Country wise
	2-2) Biodiversity conservation through environmental education	Technical cooperation: not less than 10 years,	Country wise
	2-3) Preparation of National Communication (UNFCCC)	Dispatch of expert: 1 year	Country wise
Samoa	3-1) Promotion of community-based forest management (Adaptation)	Technical cooperation: 5 years	Country wise
	3-2) Community based watershed management in the critical watershed(Mitigation/adaptation)	T/A or Development study of 10 years, Development study including pilot project	Country wise
	3-3) Updating of the forestry database using the latest satellite images (mitigation/adaptation)	Technical cooperation on a regional type	Regional
	3-4) controlling invasive plants in the protected area (adaptation)	Technical cooperation on a regional type	Regional
	3-5) Community-based biodiversity conservation (adaptation)	Technical cooperation: 5 years	Country wise
Tonga	4-1) Natural forest inventory using the satellite images (Mitigation/adaptation)	Technical cooperation on a regional type, dispatch of JOCV	Regional
	4-2) Sustainable forest management of the remaining forest (adaptation/mitigation)	Development study including pilot survey	Country wise
	4-3) Formulation and implementation of watershed management(adaptation/mitigation)	Dispatch of JOCV/JOSV to the forestry department	Country wise
	4-4) Restoration and rehabilitation of mangrove and littoral forest (Adaptation)	Combination of technical cooperation & dispatch of JOCV	Country wise
	4-5) Assistance in planting trees in	Dispatch of JOCV to the	Country wise

Country	Project	Scheme	Implementation
	TAX allotments (Adaptation/Mitigation)	Forestry Department	
Solomon islands	5-1) Inventory survey of rare/useful plants and study on the utilization and extension	Combination of technical cooperation on a regional level & dispatch of JOCV	Regional
	5-2) Rehabilitation of national herbarium and botanical garden in Honiara (Adaptation)	Cultural grant aid: 2 years	Country wise
	5-3) Development of forestry information system and preparation of sustainable forest management plan (Adaptation)	Combination of technical cooperation on a regional level and dispatch of JOCV	Regional
Kiribati	6-1) Audio-visual education on the biodiversity conservation (Adaptation)	Dispatch of JOCV: 2 years	Country wise
	6-2) IT systems and data base of MELAD (Adaptation)	Dispatch of JOCV: 2years	Country wise

Preparatory Study on the Program for Climate Change in the Pacific Islands
(Conservation of Forest Ecosystem / Environmental Monitoring)

【Papua New Guinea】

2.1 Schedule of the Study

No.	Date	Time	Activities	Logging
1	3/25 (Wed)		◆ Trip [Narita→ Brisbane]	
2	3/26 (Thu)	16:00	◆ Trip [Brisbane → Port Moresby] ◆ Meeting with JICA PNG Office	Port Moresby
3	3/17 (Fri)	10:30 13:30 15:00	◆ Courtesy call & discussion with AusAID ◆ Courtesy call & discussion with World Bank ◆ Courtesy call to Embassy of Japan	Port Moresby
4	3/28 (Sat)		◆ Data review & analysis	Port Moresby
5	3/29 (Sun)		◆ Data review & analysis	Port Moresby
6	3/30 (Mon)	10:30 13:30 15:00	◆ Courtesy call & discussion with National Forest Authority (NFA) ◆ Courtesy call & discussion with University of PNG ◆ Courtesy call & discussion with Office of Climate Change & Environmental Sustainability (OCCES)	Port Moresby
7	3/31 (Tue)	14:00	◆ Trip PX272 [09:25 POM → 10:50 Rabaul] ◆ Courtesy call & discussion with PNG Open Bay Timber Ltd.	Kokopo
8	4/1 (Wed)		◆ Trip by boat [08:00 Rabaul → 12:00 Open Bay] ◆ Visit plantations of Open Bay Timber Ltd.	Open Bay
9	4/2 (Thu)		◆ Visit plantations of Open Bay Timber Ltd.	Open Bay
10	4/3 (Fri)	14:00	◆ Trip by boat [9:00 Open Bay→ 13:00 Rabaul] ◆ Courtesy call & discussion with NFA Regional Office	Kokopo
11	4/4 (Sat)		◆ Trip PX213 [13:25 Rabaul → 14:30 Lae]	Lae
12	4/5 (Sun)		◆ Data review & analysis	Lae
13	4/6 (Mon)	08:30 10:30 13:30 14:30	◆ Courtesy call & discussion with Forest Research Institute (FRI) ◆ Courtesy call & discussion with Unitech ◆ Courtesy call & discussion with Timber & Forestry Training College (TFTC) ◆ Move to Bulolo from Lae by car	Bulolo
14	4/7 (Tue)	09:30 10:30	◆ Courtesy call & discussion with PNG Forest Products Ltd. ◆ Courtesy call & discussion Bulolo Forestry College ◆ Trip PX109 [17:15Lae → 18:00 Port Moresby]	Port Moresby
15	4/8 (Wed)	09:00 13:00 14:00 15:30	◆ Courtesy call & discussion with UNDP ◆ Courtesy call & discussion with NRI ◆ Discussion with NFA ◆ Courtesy call & discussion with FIA	Port Moresby
16	4/9 (Thu)	08:00 10:00 13:30 15:00 16:00	◆ Discussion with AusAID ◆ Courtesy call & discussion with Fishery Authority ◆ Courtesy call & discussion with UK High Commission ◆ Report to Embassy of Japan ◆ Report to JICA PNG Office	Port Moresby
17	4/10 (Fri)		◆ Trip PX005 [14:30 Port Moresby → 17:25 Brisbane]	Brisbane

【Papua New Guinea】

2.2 Brief Features of Proposed Projects

1. Forest Inventory using satellite data 【Mitigation】	
(1) Objectives	<ul style="list-style-type: none"> ◆ Obtain data on existing forest resources with higher accuracy for long-term planning of forest development and management ◆ Provision of forestry data to timber companies for their better management of forest and reporting to NFA on their data of operation ◆ Estimation of carbon emission or sequestration from deforestation and reforestation (secondary objective)
(2) Area	Priority area where forest development is on-going such as New Britain Island
(3) Counterpart	National Forest Authority (including head office, FRI and field office)
(4) Activities	<ul style="list-style-type: none"> ◆ Forest inventory by the combination of the interpretation/analysis of high resolution satellite data and field survey (involve students of UNITEC forestry faculty for OJT) ◆ Preparation of existing forest maps (1/10,000~) ◆ Establishing database on forest resources ◆ Collecting data on carbon emission or sequestration ◆ Estimation of carbon emission and sequestration
(5) Background/ Justification	<ul style="list-style-type: none"> ◆ NFA needs to formulate long-term forest development and management plan for sustainable use of forest resources. But the forestry data available now can not be used for the planning due to low accuracy. ◆ Formulation of long-term and sustainable forest development and management plan is more important than REDD because forest resources are one of major sources of national income. ◆ NFA shall acquire the capability of remote sensing data analysis as the responsible agency for forest development and management. University of PNG has such capability but NFA shall not rely on them since UPNG may likely change their research topic in the future. ◆ Forest inventory supported by FAO and AusAID does not match the needs of NFA in terms of data accuracy.
(6) Scheme	<p>(a) Technical Assistance Project of JICA aiming at technology transfer and capacity development of counterpart agency</p> <p>(b) If TA is successful and PNG government desires to implement forest inventory in other area, combination of financial assistance in a form of loan and TA (grant) shall be considered、</p>
(7) Project duration	◆ 3 Years for (a) and 7 years for (b)

2. Development Study on Participatory Forest Management Project (including AR-CDM) [Mitigation]	
(1) Objectives	<ul style="list-style-type: none"> ◆ Promotion of economic use of unused grassland through reforestation ◆ Increased income of land owners and local communities ◆ Awareness raising of land owners on economic benefits of reforestation in unused grassland ◆ Reduction of infrastructure damage by land slide through land use change (reforestation)
(2) Area	To be selected from highland region where unused grassland exist widely (Enga, Southern, Western and Eastern Highland, Chimbu, and Morobe provinces)
(3) Counterpart	Forest Enterprise (Local Office, FRI, UNITEC/ Faculty of forestry)
(4) Activities	<ul style="list-style-type: none"> ◆ Awareness raising to land owners and local governments on economic use of unused grassland through reforestation ◆ Preparation of a master plan of reforestation and forest management ◆ Selection of sites for formulation of pilot project and formulation the plan of pilot project (including AR-CDM project if possible) ◆ Development of PDD for registration of AR-CDM project ◆ Project validation by DOE ◆ Implementation of the pilot project
(5) Background/ Justification	<ul style="list-style-type: none"> ◆ There exist about 3.2 millions ha of unused grassland in highland regions. Such land does not produce any economic income for the land owners and local community. Further, it induces land slide since the water holding capacity of the land is low. ◆ There is no problem in the land eligibility of the unused grassland since the vegetation was cleared long time ago. Reforestation in the land could produce dual benefits for the land owner and local community: from timber and carbon credit. ◆ It seems to be difficult to reach a international consensus on REDD. Hence, people concerned to forestry sector in PNG now see implementation of AR-CDM more feasible than REDD.
(6) Scheme	Development Study including formulation of reforestation master plan and of the plan of pilot project as well as implementation of the pilot project
(7) Project duration	3 years for formulation of reforestation master plan and pilot project 2 years for implementation of the pilot project

3. Activation of Forestry Research and Education 【Adaptation】	
(1) Objectives	<ul style="list-style-type: none"> ◆ Activation of forestry research and education in line with recent movements in forestry sector in PNG such as reforestation, community forestry, AR-CDM and REDD. ◆ Capacity development of forestry students
(2) Area	Area around Lae where FRI, UNITEC and TFTC are located
(3) Counterpart	FRI, UNITEC, and TFTC
(4) Activities	<ul style="list-style-type: none"> ◆ Selection, propagation and extension of species for reforestation ◆ Developing volume tables and growth tables ◆ Expansion and improvement of the Seed Center ◆ Conducting researches on socio-economic aspects of forestry (such as valuation of the environmental services of forests) ◆ Conducting forestry research and education reflecting the needs of private sector ◆ Joint research with UNITEC. Support for students' research and OJT.
(5) Background/Justification	<ul style="list-style-type: none"> ◆ Lae is the center of forest research and education in PNG with FRI, UNITEC and TFTC. ◆ There is a shift from logging of natural forest to reforestation in PNG. ◆ NFA stresses participation of land owners and local communities in forest development and management. Socio-economic aspects of forest development and management are increasingly important.
(6) Scheme	Technical Assistance Project
(7) Project duration	10 years

4. Survey and Research on Biodiversity 【Adaptation】	
(1) Objectives	◆ Inventory and ecological survey of existing fauna and flora
(2) Area	to be selected
(3) Counterpart	School of Natural and Physical Science, University of PNG
(4) Activities	<ul style="list-style-type: none"> ◆ Inventory survey of existing fauna and flora ◆ Identification of new species ◆ Ecological survey of existing fauna and flora ◆ Preservation of rare and endangered species of fauna and flora including propagation
(5) Background/Justification	<ul style="list-style-type: none"> ◆ It is predicted that many species of fauna and flora including the one yet unidentified are in danger of extinction due to the effects of climate change. ◆ Extinction of species would affect ecology of the country and region as a whole
(6) Scheme	Technical Assistance Project (in collaboration with Japanese universities)
(7) Project duration	5 years + α

5. Participatory Management of Mangrove Forest [Adaptation]	
(1) Objectives	<ul style="list-style-type: none"> ◆ Awareness raising to land owners and local community on importance of mangrove forest ◆ Planting and sustainable management of mangrove
(2) Area	to be identified
(3) Counterpart	NFA and provincial government
(4) Activities	<ul style="list-style-type: none"> ◆ Survey on the land suitable for mangrove planting ◆ Awareness raising to land owners and local community ◆ Planting mangrove with participation of the land owners and local community ◆ Development of PDD for AR-CDM (if possible and desirable) ◆ Formulation of the plans for income generation and pilot projects ◆ Collaboration and exchange of experiences with other mangrove projects within and outside of PNG
(5) Background/Justification	<ul style="list-style-type: none"> ◆ Mangrove forest has been deteriorated due to increasing demand of firewood accompanied by population increase. ◆ Mangrove could prevent and minimize coastal erosion due to high tides ◆ Mangrove forest could enrich coastal fishery resources and thus contribute to increased income of local people.
(6) Scheme	Technical Assistance Project or Development Study
(7) Project duration	5 years for Technical Assistance Project; 3 years for Development Study

Annex 2.3: Forest change in PNG

Province	Zoon	1972 Primary Forest Area (ha)	2002 Forest Area			1972-2002 Change									
						DF					DG	DF & DG			
			Total (ha)	Primary (ha)	Degraded(ha)(%)*	NF(%)					F(%)	Tot.(%)	F(%)	Tot.(%)	
						Sob.	Fine.	Plant .	Min.	Tot.					
Southern Highlands	H	2,126,200	1,877,043	1,869,724	7,319 (0.39%)	10.62	0.89	0	0	11.51	0.21	11.72	0.34	12.06	
Enga	H	929,318	807,871	807,871	0 (0.00%)	12.91	0.05	0	0.1	13.07	0	13.07	0	13.07	
Western Highlands	H	583,448	498,065	498,065	0 (0.00%)	13.88	0.59	0	0	14.48	0.16	14.63	0	14.63	
Chimbu	H	435,907	363,714	363,714	0 (0.00%)	12.05	4.51	0	0	16.56	0	16.56	0	16.56	
Eastern Highlands	H	701,660	572,679	565,542	7,137 (1.25%)	17.19	0.68	0	0	17.97	0.41	18.38	1.02	19.4	
Western	LC	5,194,206	4,575,048	4,022,038	553,010 (12.09%)	6.45	2.9	0	0.93	10.28	1.64	11.92	10.65	22.57	
Gulf	LC	2,522,310	2,367,151	2,029,969	337,182 (14.24%)	5.03	0.02	0	0	5.05	1.1	6.15	13.37	19.52	
Central	LC	2,382,124	1,963,004	1,783,019	179,985 (9.17%)	12.96	1.01	0.16	0	14.13	3.46	17.59	7.56	25.15	
Milne Bay	LC	1,134,974	926,031	825,401	100,630 (10.87%)	14.67	0.19	1.08	0.07	16.01	2.4	18.41	8.87	27.28	
Oro	LC	1,793,923	1,559,545	1,469,458	90,087 (5.78%)	9.44	1.06	0.38	0	10.87	2.19	13.07	5.02	18.09	
Morobe	LC	2,641,800	2,096,544	1,986,415	110,129 (5.25%)	15.77	1.84	0	0	17.61	3.03	20.64	4.17	24.81	
Madang	LC	2,419,307	1,994,812	1,921,034	73,778 (3.70%)	15.13	0.49	0	0	15.61	1.93	17.55	3.05	20.6	
East Sepik	LC	2,371,213	2,046,917	2,002,745	44,172 (2.16%)	12.73	0.36	0.12	0	13.21	0.47	13.68	1.86	15.54	
West Sepik	LC	3,105,473	2,728,396	2,488,155	240,241 (8.81%)	10.17	0.58	0	0	10.75	1.39	12.14	7.74	19.88	
Manus	I	150,700	124,000	102,381	21,619 (17.43%)	11.22	0	0	0	11.22	6.49	17.72	14.35	32.06	
New Ireland	I	820,606	646,802	387,405	259,397 (40.10%)	8.78	0.85	0.16	0.1	9.9	11.28	21.18	31.61	52.79	
East New Britain	I	1,358,933	1,138,487	885,377	253,110 (22.23%)	7.45	0	0.58	0	8.03	8.19	16.22	18.63	34.85	
West New Britain	I	1,847,904	1,499,119	857,201	641,918 (42.82%)	3.19	0.49	3.16	0	6.84	12.03	18.87	34.74	53.61	
Bougainville	I	707,584	466,739	466,739	0 (0.00%)	34.04	0	0	0	34.04	0	34.04	0	34.04	
PNG Total		33,227,590	28,251,967	25,332,253	2,919,714 (10.33%)	10.85	1.04	0.28	0.15	12.3	2.67	14.97	8.79	23.76	

Summary statistics 1972-2002. Change percentages are net percentages of primary forest area in 1972 that were deforested (DF), degraded (DG), deforested or degraded (Tot), by 2002 listed

according to causes: F=Forestry, NF=Non-forestry (Sub.=Subsistence, Plant.=Plantation, Min.=Mining,), Tot.=Total (F+NF). Zones: H=Highlands, LC=Mainland lowland coastal, I=Islands. *Percentage of forest in 2002 which is degraded. In Bougainville there has been no commercial logging since 1988 due to civil conflict (Regan & Griffin, 2005) and records of the extent of logging prior to the conflict are unreliable. For this reason all forest clearance in Bougainville is recorded as non-forestry related (34.04%) despite the likelihood that a percentage of this was forestry-related.

Source: The State of the Forests of Papua New Guinea: Mapping the extent and condition of forest cover and measuring drivers of forest change in the period 1972-2002, October 2008, University of Papua New Guinea.

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【Vanuatu】

3.1 Schedule of the Study

No.	Date	Time	Activities	Logging
18	4/11 (Sat)		◆ Data review & analysis	Brisbane
19	4/12 (Sun)		◆ Trip NF021 [08:30 Brisbane → 11:30 Port Villa] ◆ Data review & analysis	Port Villa
20	4/13 (Mon)		◆ Data review & analysis	Port Villa
21	4/14 (Tue)	09:00 11:00 14:00	◆ Meeting with JICA Vanuatu Office ◆ Courtesy call & discussion with AusAID ◆ Courtesy call & discussion with Department of Forestry	Port Villa
22	4/15 (Wed)	08:00 09:00	◆ Courtesy call & discussion with NACCC ◆ Field reconnaissance in Efate island	Port Villa
23	4/16 (Thu)	14:00	◆ Trip NF242 [10:00 Port Villa → 10:45 Tanna] ◆ Courtesy call & discussion with forestry office in Tafea province	Tanna
24	4/17 (Fri)	08:00	◆ Courtesy call & discussion with Tanna Community Conservation Officer ◆ Field reconnaissance in Tanna island	Tanna
25	4/18 (Sat)		◆ Trip NF241 [09:00 Tanna → 09:45 Port Villa] ◆ Data review & analysis, report preparation	Port Villa
26	4/19 (Sun)		◆ Data review & analysis, report preparation	Port Villa
27	4/20 (Mon)	10:00 14:00 15:00	◆ Courtesy call & discussion with Environment Unit ◆ Collection of additional information from Department of Forest ◆ Courtesy call & discussion with Landholders Conservation Initiatives Project Office	Port Villa
28	4/21 (Tue)	10:00	◆ Report to JICA Vanuatu Office	Port Villa
29	4/22 (Wed)		◆ Trip NF005 [15:30 Port Villa → 17:30 Sydney]	Sydney
30	4/23 (Thu)		◆ Trip JL772 [8:30 Sydney → 17:00 narita]	

【Vanuatu】

3.2 Brief Features of Proposed Projects

1. Forest Inventory and Formulation of Forestry Sector Plan 【Mitigation/Adaptation】	
(1) Objectives	<ul style="list-style-type: none"> - Update of data on forest resources - Formulation of long-term and sustainable forest development and management plan - Collection of data for estimation of carbon emission and sequestration from forests (secondary objective)
(2) Area	Major Islands only
(3) Counterpart	Department of Forest
(4) Activities	<ul style="list-style-type: none"> ◆ Forest inventory by the combination of the interpretation/analysis of high resolution satellite data and field survey (including update of vegetation maps and estimation of log volume) ◆ Formulation of forestry sector plan
(5) Background/Justification	<ul style="list-style-type: none"> ◆ Existing data on forest resources is derived from interpretation of aerial photo taken in 1989 and thus outdated. ◆ Forestry Act (2001) requires to formulate the forestry sector plan, which would be the basis for forest development and management in the country. ◆ Forest resources were and will be an important source of income for the government and the people as well. Formulation of the forestry sector plan is necessary for sustainable utilization and management of the forests. ◆ FAO does not respond to the request from DOF for assisting forestry sector plan formulation including updating of forest inventory. It is likely that other donors will not provide assistance to this activity due to high cost required.
(6) Scheme	Development Study
(7) Project duration	2 years

2. Biodiversity Conservation (Sustainable Forest Management) through Environmental Education and Income Generation [Mitigation]	
(1) Objectives	Community-based conservation of forest and biodiversity
(2) Area	to be decided (Environment Unit proposed Santo or Ambae islands)
(3) Counterpart	Department of Forest, Environment Unit, Provincial government
(4) Activities	<ul style="list-style-type: none"> ◆ Awareness raising on importance of forest/biodiversity and traditional conservation initiatives and environmental education for land owners, local communities and students ◆ Participatory land use planning and ecology survey ◆ Tree planting for income generation (sandalwood, white wood, etc.) ◆ Training on ecotourism development ◆ Fulfillment of community needs (securing clean drinking water, income generation using local resources, etc.)
(5) Background/Justification	<ul style="list-style-type: none"> ◆ Vanuatu is rich in biodiversity, which attracts tourists and thus shall be conserved. ◆ National Biodiversity Conservation Strategy (1999) proposes important actions for biodiversity conservation. Many of them have not been implemented yet and actions taken are insufficient in terms of duration of implementation and outcomes.
(6) Scheme	Technical Assistance Project (with JOCV)
(7) Project duration	at least 10 years

3. Assistance for Preparation of 2nd National Communication	
(1) Objectives	To prepare 2 nd National Communication that shall be submitted to UNFCCC
(2) Area	-
(3) Counterpart	NACCC
(4) Activities	<ul style="list-style-type: none"> ◆ Collection and review of data related to GHG emissions and removals ◆ Estimation of GHG emissions and removals ◆ Assessment of vulnerability to climate change, financial sources for implementing mitigation and adaptation measures, transfer of technology, capacity development and awareness raising ◆ Preparation of a report
(5) Background/Justification	<ul style="list-style-type: none"> ◆ Vanuatu ratifies UNFCCC (United Nations Convention on Climate Change) and is required to report UNFCCC secretariat the information on GHG emissions and removals, and details of activities undertaken to implement the Convention.
(6) Scheme	Dispatch of experts
(7) Project duration	one year

Note: This is not a project in forest ecology sector.

Preparatory Study on the Program for Climate Change in the Pacific Islands
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【Samoa】

4.1 Schedule of the Study

Date	Activities
March 29 (Sun)	Arrival at Apia
March 30 (Mon)	Meeting with JICA Samoa Office, Meetings with WRD, CEO of MNRE, State Tourism Authority, and SPREP
March 31 (Tue)	Meetings with LMD, MITD, FD, ECD of MNRE and UNDP
April 1 (Wed)	Meetings with ECD, FD, and TSD of MNRE
April 2 (Thu)	Meeting with JICA Project Team and Site Observation
April 3 (Fri)	Site Visits to Vaisigano watershed and Marine Protected Areas
April 4 (Sat)	(Data arrangement)
April 5 (Sun)	(Data arrangement)
April 6 (Mon)	Meetings with CI and Watershed Management Section of WRD, MNRE
April 7 (Tue)	Meetings with AusAID and FAO, Discussion with the relevant divisions of MNRE about the proposed mitigation / adaptation measures
April 8 (Wed)	Meetings with SPREP
April 9 (Thu)	Discussions with MNRE and FAO, Report to JICA Samoa Office
April 10 (Fri)	Leaving for Aukland

Preparatory Study on the Program for Climate Change in the Pacific Islands
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【Samoa】

4.2 Brief Features of Proposed Projects

1. Assistance in Promotion of Community-based Forest Management 【Adaptation and Mitigation Measures】	
(1) Objectives:	<ul style="list-style-type: none"> ◆ To properly conserve and manage the remaining forests in the customary land ◆ To improve livelihoods of local communities through introduction of agroforestry practices, sustainable agricultural technologies, cash crops, and income generating activities based on forest-related resources. ◆ To maintain precious ecosystems and biodiversity in the country ◆ To enhance the capacity of local communities and public awareness of the importance of forest resources ◆ To help the GOS acquire the techniques relating to community-based forest management
(2) Target Areas:	Savai Island
(3) CP Agencies:	MNRE (FD, ECD, and LMD)
(4) Activities:	<ul style="list-style-type: none"> ◆ To raise public awareness of the value of natural resources and importance of forests ◆ To make a future land use map with identification of community conservation areas of villages where the natural forest still remain ◆ To formulate the village regulations on management of the community conservation areas in a participatory manner ◆ To disseminate sustainable farming techniques / practices including introduction of agroforestry techniques and cash crop production ◆ To conduct a bio-ecological survey at the conservation areas with Environment and Conservation Department and SPREP
(5) Background:	<ul style="list-style-type: none"> ◆ There are still substantial areas of natural forests remaining in Savai Island. Such natural forests are considered the important habitats for precious ecosystems, which include endemic and endangered species. However, many forests are located in the customary land and being under pressure from human activities, such as farming, logging, and hunting. ◆ Hence, development of a system/mechanism to conserve / protect the natural forest in the customary land in a collaborative manner is essential for conservation of the natural forests and their forest ecosystems in Samoa. ◆ The on-going JICA project has been developing a model for managing the protected area in the government land. But, there has been no intervention made by the Government (Environment and Conservation Department and Forestry Department) for the customary land except the extension of agroforestry techniques and provision of seedlings. ◆ The Government of Samoa shows the intention to promote forest conservation in the customary land in the future.
(6) Expected JICA Scheme:	Technical Cooperation Type Project including public awareness campaign, participatory land use planning, formulation of the village regulations on forest management, extension of agroforestry techniques, and conduct of a bio-ecological survey.
(7) Period:	Five years

2. Assistance in Community-based Watershed Management in the Critical Watershed[Mitigation and Adaptation Measures]	
(1) Objectives:	<ul style="list-style-type: none"> ◆ To promote the proper land use and management in one of the critical watersheds ◆ To conserve forests in the watershed ◆ To maintain precious ecosystems and biodiversity in the country ◆ To enhance the capacity of local communities and public awareness of the importance of forest resources ◆ To improve livelihoods of local communities ◆ To help the GOS learn the community-based forest management approaches and acquire the techniques relating to watershed management
(2) Target Areas:	One of the critical watersheds in Savai Island
(3) CP Agencies:	MERE (Forestry Department and Water Resource Department)
(4) Activities:	<ul style="list-style-type: none"> ◆ To raise public awareness of the importance of forests and watershed ◆ To prepare a present land use and vegetation cover map of the critical watershed using the latest satellite images with a ground truth survey (It is also possible to use the outcomes to be developed by the proposed project at No. 3.) ◆ To formulate a watershed management plan with a future land use map or zoning map of the entire watershed ◆ To develop a future land use map of the respective villages within the watershed in a participatory manner ◆ To identify the conservation forests and formulate the village regulations on forest management in a participatory manner ◆ To plant trees in degraded lands in the watershed in collaboration with local communities ◆ To introduce and disseminate the environment friendly farming techniques with the view of reducing water pollution caused by chemical fertilizer, agrochemicals and animal waste ◆ To disseminate sustainable farming techniques / practices including agroforestry techniques and cash crop production
(5) Background:	<ul style="list-style-type: none"> ◆ Though the GOS identified and designated eight watersheds as the critical watersheds in the country. The Government has no effective watershed management plan for any of the critical watershed so far. A management plan based on the latest land use should be in place for proper management. ◆ It is reported that the quality of water in some of the critical watersheds has degraded due to forest degradation and improper land use. There is a need to improve the watershed functions through introduction of proper land use, conservation of forest, rehabilitation of degraded land, and control of animal grazing / use of chemical fertilizer as well as agrochemicals. ◆ The Water Resource Department of MNRE has intention to learn how to make a comprehensive land use plan and to manage a watershed in a participatory and collaborative manner. ◆ At present, EU plans to implement a project to manage one of the critical watersheds, namely, the Vaisingano watershed (the upper part of Apia), but there is no plan or intervention proposed for the other critical watersheds. ◆ This proposal is highly relevant to the NAPA proposed by the GOS.
(6) Expected JICA Scheme:	Technical Cooperation Type Project or Development Study including a pilot project component

(7) Period:	Four years
3. Assistance in improvement / update of the existing database on forest resources (SamFRIS) by using latest-cum-high resolution satellite images with a ground truth / forest inventory survey 【Mitigation and Adaptation Measures】	
(1) Objectives:	<ul style="list-style-type: none"> ◆ To update and ensure accurate information of forest resources in the country ◆ To contribute to making a sustainable forest management and development plan ◆ To identify the potential sites to be conserved as protected areas in terms of the biodiversity conservation ◆ To provide basic information necessary for formulation of watershed management plans of the critical watersheds in the country
(2) Target Areas:	Upolu Island and Savai Island (But the priority should be given to Savai Island.)
(3) CP Agencies:	MNRE (Forestry Department and Technical Service Department)
(4) Activities:	<ul style="list-style-type: none"> ◆ To analyze high resolution satellite images and conduct a ground truth / forest inventory survey ◆ To prepare forest maps (1/10,000~) ◆ To upgrade the existing database on forest resources ◆ To identify the potential areas for the protected area by overlying the forest maps with the cadastral maps
(5) Background:	<ul style="list-style-type: none"> ◆ The current forest data in Samoa are based on the database developed by the FAO in 2004 (SamFRIS). SamFRIS was established on the basis of aerial photos taken in 1999 combined with the results of a ground truth survey carried out in 2003/2004. The Forestry Department has updated SamFRIS by reflecting the results of the field monitoring undertaken by its district offices. However, the data given by the district offices are rather fragmented and not contiguous. It is, therefore, difficult for the Department to grasp the forest conditions in the entire country and its inter-annual changes. In addition, the monitoring data do not cover the damage from by farming activities and strong cyclones. Hence, the accuracy of the current data of SamFRIS is insufficient to use for making a detailed forest management plan and/or watershed management plan. There is a need to improve and update SamFRIS using the latest-cum-high resolution spatial information (either satellite images or aerial photos). ◆ There is also no data and information about distribution and inter-annual changes of mangrove forests in the country. The basic information that shows the present conditions of mangrove forests is essential to the formulation of a management/conservation plan for the remaining mangrove in the country. ◆ The Government aims to designate more areas/places that have high values of biodiversity as protected areas in accordance with the new forest management bill. The current land use information is too old to identify the potential sites.
(6) Expected JICA Scheme:	Technical Cooperation Type Project on a regional level (The project office will be placed in either SPC or SPREP and the central office will analyze the satellite images and the results of ground truth surveys to be carried out in the respective recipient countries and provide necessary training to the recipient countries. In each recipient country, a branch office or staff or SV/JOCV will be allocated to assist them in the conduct of a inventory survey and utilization/maintenance of the updated database, such as SamFRIS.)
(7) Period:	Three years

4. Assistance in management of the protected areas through control of invasive species [Adaptation Measures]	
(1) Objectives:	<ul style="list-style-type: none"> ◆ To assist MNRE in management and control of invasive species in protected areas in the country based on the results and experience gained through the on-going JICA Project. ◆ To contribute to the control of invasive species in other pacific island countries.
(2) Target Areas:	Protected area in Samoa and Other Pacific Island Countries
(3) CP Agencies:	MNRE (Forestry Department and Environment and Conservation Department), Ministry of Environment in other countries
(4) Activities:	<ul style="list-style-type: none"> ◆ To assist MNRE in identification of the damage from invasive species in other protected areas, determination of the necessary countermeasures, and implementation of such measures. ◆ To organize in-country and regional workshops on control of invasive species in coordination with SPREP ◆ To assess the extent of damage from invasive species in other countries and elaborate the necessary countermeasures for the respective countries. ◆ To implement a pilot project at each country ◆ To organize a regional workshop to draw lessons learned through the pilot projects at each country
(5) Background:	<ul style="list-style-type: none"> ◆ The on-going JICA project has dealt with the control of invasive species in the O le Pupu Pue National Park and gained some knowledge about suppression of invasive species. ◆ There are other protected areas facing the same problems in the country. The results of the JICA Project are expected to be used for those areas. However, it is considered that a follow-up assistance should be required for the GOS / MNRE to continue and extend the project activities to other protected areas after the end of the on-going project. The existence of the follow-up support from JICA would ensure that the GOS would allocate the necessary budget and human resources for extension. ◆ On the other hand, the issue on invasive species is also commonly found in other pacific island countries. Hence, it is significant that the knowledge and experience gained through the JICA project are used for other countries. ◆ In addition, SPREP has also a/ expert/s for control of invasive species; it would be effective if the proposed assistance in the protected area management is carried out in coordination with SPREP.
(6) Expected JICA Scheme:	<p>i) Technical Cooperation Type Project on a regional level (The project office should be placed at SPREP and the project will enhance the capacities of the recipient countries to control invasive species through i) assessment of the level of damage caused by invasive species, ii) formulation of countermeasures, and iii) implementation of some countermeasures as pilot projects.</p> <p>ii) Allocation of JOCV at the respective recipient countries should be taken into account.</p>
(7) Period:	Three Years

5. Establishment of community-based biodiversity conservation and monitoring systems	
(1) Objectives:	<ul style="list-style-type: none"> ◆ To conserve natural forests with high biodiversity in a collaborative manner ◆ To establish a collaborative monitoring system in which MNRE can monitor natural forests and its ecosystems with local communities
(2) Target Areas:	Natural forests in Savaii Island
(3) CP Agencies:	NMRE (Forestry Department and Environment and Conservation Department)
(4) Activities:	<ul style="list-style-type: none"> ◆ To designate the community conservation areas through providing the public awareness raising activities and close consultation with local communities ◆ To conduct a study on ecosystems and biodiversity in the designated community conservation areas in collaboration with local communities ◆ To establish a collaborative monitoring system <p>In case the proposed assistance targets coastal especially mangrove forest.</p> <ul style="list-style-type: none"> ◆ To plant mangrove in the degraded mangrove forests together with local communities ◆ To formulate the village regulations on the conservation of mangrove forest in the village ◆ To develop linkages with the on-going mangrove conservation projects in and around the country
(5) Background:	<ul style="list-style-type: none"> ◆ As many of the remaining forest ecosystems are located in the customary land, community participation is requisite for the conservation of forests and forest ecosystems. ◆ It is expected that local communities would protect and conserve the ecosystems once their heads (Matai) understand the importance and determine to protect them. ◆ In case mangrove is the main target for protection, the project activities, such as conservation and rehabilitation, could directly improve their livelihoods.
(6) Expected JICA Scheme:	Technical Cooperation Type Project
(7) Period:	Five years

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【Tonga】

5.1 Schedule of the Study

Date	Activities
April 13 (Mon)	Arrival at Nuku Alofa
April 14 (Tue)	Meeting with JICA Tonga Office, Meetings with DNRE and FD
April 15 (Wed)	Meetings with DoT, DNRE, and FD
April 16 (Thu)	Meetings with AusAID, CEO of MAFF, and TANGO
April 17 (Fri)	Field visit to the forest plantation, watershed area, and national park in Eua Island
April 18 (Sat)	(Data arrangement)
April 19 (Sun)	(Data arrangement)
April 20 (Mon)	Meeting with Tonga Water Board
April 21 (Tue)	Field visit to mangrove plantation and littoral forest plantation sites in Tongatapu Discussion with DNRE and DF about the proposed mitigation / adaptation measures
April 22 (Wed)	Report to JICA Tonga Office and EOJ
April 23 (Thu)	Leaving for Auckland

Note: DNRE: Department of Natural Resources and Environment, FD: Forestry Division, DoT: Department of Tourism

Preparatory Study on the Program for Climate Change in the Pacific Islands
(Conservation of Forest Ecosystem / Environmental Monitoring)

【Tonga】

5.2 Brief Features of Proposed Projects

1. Assistance in implementation of the national forest inventory using latest-cum-high resolution satellite images to update data on forest resources in the country 【Adaptation and Mitigation measures】	
(1) Objectives:	<ul style="list-style-type: none"> ◆ To assist MAFFF in implementation of the national forest inventory ◆ To secure and update the highly accurate data on the remaining forests ◆ To assist MAFFF in conservation of the remaining natural forests and preparation of a sustainable forest management plan ◆ To grasp the present condition of existing mangrove forests ◆ To provide basic data necessary for formulation of a watershed management plan of the critical watersheds
(2) Target Areas:	Eua and Hapai Islands (But the priority should be given to Eua Island.)
(3) CP Agencies:	MAFFF (Forestry Division), MLSNRE (DENR and DLS)
(4) Activities:	<ul style="list-style-type: none"> ◆ Assistance in implementation of the national forest inventory using high resolution satellite images ◆ Preparation of forest maps (1/10,000~) ◆ Establishment of a database on forest resources ◆ Assistance in formulation of a forest management plan in Eua Island by the separate assistance of Senior Volunteer (SV) or Japan Overseas Cooperation Volunteer (JOCV)
(5) Background:	<ul style="list-style-type: none"> ◆ There is no systematic data on forest resources in Tonga. The existing data on forest resources are fragmented and originate from studies and researches carried out 10 years ago. ◆ In fact, the forest resources in the country are very limited, but the natural forests remaining in some of the islands, such as Eua, apparently have diversified forest ecosystems. Hence, it would be quite important for the country to manage such forests in a proper and sustainable manner from the viewpoint of biodiversity conservation. ◆ The production forest and watershed forest in Eua should be managed properly for the respective purposes. Detailed and update data on forest resources are requisite for planning.
(6) Expected JICA Scheme:	<ul style="list-style-type: none"> i) Technical Cooperation Type Project on a regional level (The project office will be placed in either SPC or SPREP and the central office will analyze the satellite images and the results of ground truth surveys to be carried out in the respective recipient countries and provide necessary training to the recipient countries.) ii) It is recommended that a JOCV should be dispatched in addition to the technical cooperation type project with the aim of i) management and update of data on forest resources in Tonga, and ii) provision of technical assistance in the national forest inventory. iii) The proposed project can be tied up with other activities that would require

	data on forest resources, such as watershed management, forest management and protected area management.
(7) Period:	i) Three years for the Technical Cooperation Type Project+ ii) Six years for further JOCV assistance

2. Assistance in sustainable forest management of the remaining natural forests 【Adaptation and Mitigation】	
(1) Objectives:	<ul style="list-style-type: none"> ◆ To formulate a forest management plan to contribute to the proper management of the remaining natural forest, watershed forest, and production forest in Eua ◆ To execute forest management activities in accordance with a forest management plan ◆ To maintain precious forest ecosystems and biodiversity ◆ To enhance the capacity of local communities and public awareness of the importance of forest resources ◆ To help the GOT learn the community-based forest management approaches
(2) Target Areas:	Eua Island
(3) CP Agencies:	MAFFF (Forestry Division), MLSNRE (DENR and DLS), Tonga Timber Ltd. (TTL), Tonga Water Board (TWB)
(4) Activities:	<ul style="list-style-type: none"> ◆ Update of data on forest resources in the island using the latest satellite images with a ground truth survey (It is also possible to use the results of the project proposed for the update of data on forest resources.) ◆ Preparation of a forest management map by overlying the forest resource map with other thematic maps, such as slope map, land classification / cadastral map, and watershed map. ◆ Classification of forest types and determination of management principles for each forest type (such as production forest, watershed forest, forest in buffer zone of the national park, natural forest in noble land, and forest in tax allotments) ◆ Development of capacity of the Forestry Division to monitor and supervise the management practices and forest operations of TTL ◆ Trial implementation of a watershed management plan, such as fencing along the boundaries of the watershed, tree planting in degraded areas, and conversion of composition of forest from coniferous forest to mixed forest. ◆ Preparation of a watershed management policy with MAFFF and FD to mainstream the watershed management in their mandates
(5) Background:	<ul style="list-style-type: none"> ◆ Eua Island is the sole area that has still natural forests. There are several types of forests, namely, national park, production forest, watershed forest and reserved forest in noble land, in the island. The respective forests should be managed in response to the respective management objectives. ◆ According to the Forestry Division, TTL has not managed the production forest in the island properly since the management of production forest was transferred from the Forestry Division to TTL in 2003 ◆ Although the conservation activities have been carried out on the initiative of TWB recently, those are not sufficient to improve the functions of the watersheds.
(6) Expected JICA	i) Development Study with pilot projects

Scheme:	ii) Allocation of JOCV
(7) Period:	i) Three years for the Study ii) Six year for JOCV allocation

3. Assistance in formulation and implementation of a watershed management plan in the catchment of the public water supply system in Eua 【Adaptation and Mitigation Measures】	
(1) Objectives:	<ul style="list-style-type: none"> ◆ To promote proper land use and management of the catchment area of the public water supply in Eua Island ◆ To assist in conservation of forests in the catchment ◆ To plant trees in degraded lands in the catchment ◆ To develop a mechanism to manage the catchment in a sustainable manner
(2) Target Areas:	Eua island
(3) CP Agencies:	MAFFF (Forestry Division), Tonga Timber Ltd., Tonga Water Board
(4) Activities:	<ul style="list-style-type: none"> ◆ Preparation of a forest resource and distribution map by a ground truth or forest inventory survey with the existing forest distribution map prepared in 2000 (It would be more effective if the results of the project proposed above for the update of data on forest resources can be used.) ◆ Determination of the management objectives of the watershed based on the present land use and slope conditions of the target areas, such as i) area for enrichment, and iii) area for mixed forest with broad leave trees. ◆ Formulation of management plans for the respective management objectives ◆ Formulation of a conservation plan for the entire watershed ◆ Conduct of management activities (e.g., tree planting, enrichment planting, and replanting) and conservation activities (e.g., fencing, fire line making and patrolling)
(5) Background:	<ul style="list-style-type: none"> ◆ Eua Island is the sole area using the surface water for public water supply. Almost all the population in the island (about 4,000~5,000) rely on the public water supply provided by Tonga Water Board. ◆ The catchment area of the water supply system encompasses for farmlands in tax allotments and production forest. Since the area was designated as the critical watershed, the farmlands were relocated from the watershed and no exploitation has been made in the production forest. Hence, there seems to be no direct threat caused by human activities at present. It is, however, still important to improve the functions of the watershed through intensive conservation and forest management activities to improve the quality of water and secure the supply of water. ◆ Though the Forestry Division has a forest classification map prepared in 2000, there is no watershed management plan at present. The division still needs assistance in formulation and implementation of a management plan for the watershed in Eua.,
(6) Expected JICA Scheme:	Allocation of Senior Volunteer for forest management and JOCV for GIS/Forest inventory
(7) Period:	Four years

4. Assistance in restoration and rehabilitation of mangrove and littoral forests (It is recommended that this activity should be carried out as a part of a disaster management program.)	
(1) Objectives:	<ul style="list-style-type: none"> ◆ To reduce damage from salt spray and strong wind through establishment / rehabilitation of littoral forests ◆ To protect coastal land from soil erosion caused by high tide through rehabilitation of mangrove forests
(2) Target Areas:	Coastal area and lagoon of Tongatapu island Coastal area of Ha'apai island
(3) CP Agencies:	MLSNRE (DENR) and MAFFF (Forestry Division)
(4) Activities:	<ul style="list-style-type: none"> ◆ Identification of areas vulnerable to salt spray / strong wind and land erosion on the occurrence of cyclone and high tide, respectively. ◆ Raising of public awareness of the functions and importance of littoral and mangrove forests among local communities residing the identified areas ◆ Rehabilitation of littoral and/or mangrove forest with participation of local communities ◆ Formulation and finalization of an agreement with local communities on management of littoral and/or mangrove forests rehabilitated ◆ Development of linkages with on-going mangrove projects in and around the country
(5) Background:	<ul style="list-style-type: none"> ◆ Crop damage from salt spray and coastal land erosion due to high tide have often been reported recently. In addition, erosion of coastal lands due to high tide is extensively found. As climate change progresses, such damage would be widespread. ◆ On the other hand, it is also reported that mangrove forests in the country have reduced year by year mainly owing to firewood collection, conversion of mangrove forest into residential area, and collection of raw materials for carving. The vulnerability to soil erosion caused by high tide has become high. ◆ The current land act defines that the coastal area within about 15 meter from the high mark of normal tide shall be managed by the government. Therefore, there would be no land tenure issue in rehabilitation / establishment of mangrove and/or littoral forests in the coastal area in principle.
(6) Expected JICA Scheme:	It is recommended that this project be implemented as a part of a technical cooperation type project for disaster management and a JOCV be placed at the Forestry Division or Department of Natural Resources and Environment to strengthen the linkage with other government offices, such as the Ministry of Public Works and Disaster Relief Activities.
(7) Period:	Five Year

5. Assistance in planting trees in Tax Allotments 【Adaptation / Mitigation Measures】	
(1) Objectives:	<ul style="list-style-type: none"> ◆ To assist MAFF in encouraging local communities to plant trees introducing agroforestry techniques, wind break forest and farm forest in tax allotments
(2) Target Areas:	Tongatapu island, Vavau island, Ha'apai island, and Eua island
(3) CP Agencies:	MAFFF (Forestry Division)
(4) Activities:	<ul style="list-style-type: none"> ◆ Data collection and compilation of traditional agroforestry practices and existing agroforestry and/or tree-based farming techniques introduced by donor-funded projects ◆ Assessment of suitable conditions for application of traditional/ and existing agroforestry techniques and identification of the practices and techniques suitable for the target areas (e.g., wind break forest in the area vulnerable to strong wind, farm forest in the area in need of firewood, and fruit and industrial crops in the area close to residential / urban areas) ◆ Development of designs of demonstration plots for the identified agroforestry and tree-based farming models ◆ Establishment of demonstration plots for the agroforestry and tree-based farming models in partnership with local communities ◆ Development of public awareness campaign materials for promotion of agroforestry and tree-based farming models ◆ Implementation of public awareness campaigns
(5) Background:	<ul style="list-style-type: none"> ◆ Although the Forestry Division/MAFFF defines the promotion of tree planting through introduction agroforestry techniques in tax allotments as one of the priority objectives of the government, the division has only produced and distributed seedlings. In order to promote tree planting, more substantial extension works shall be carried out. But it is still difficult for the division to take necessary actions due to lack of capacity. ◆ On the other hand, the following external factors, namely, expansion of crop damage from strong wind, reduction of sources of firewood, heightening of need to new promising crops in replacement of pumpkin, have a positive environment for introduction of agroforestry techniques in tax allotments. ◆ In order to promote the introduction of agroforestry techniques in tax allotments, the extension works of the Forestry Division need to be improved and strengthened so that local communities could observe the actual results/effects of the introduced techniques and be encouraged to replicate them into their plots.
(6) Expected JICA Scheme:	Allocation of JOCV to the Forestry Division
(7) Period:	Four years

Preparatory Study on the Program for Climate Change in the Pacific Islands
(Conservation of Forest Ecosystem/Environmental Monitoring)

【Solomon Islands】

6.1 Schedule of the Study

Month/Day	Time	Works
March 29 Sunday	13:30 15:00	Move from Brisbane to Honiara Meeting with JICA Solomon Island Office
March 30 Monday	9:00 10:30 12:00 13:30	Courtesy call to the PS of Ministry of Land, Housing and Survey (MLHS), Data collection at GIS office Meeting at JICA Solomon Island Office, Interview with Ms.Hakata(JICA Expert) Interview with Mr.Saito at UNDP Honiara Office Meeting at JICA Office, Arrangement of information, Making of appointment
March 31 Tuesday	10:00 15:00	Courtesy call and interview with the PS of Ministry of development planning and aid cooperation Interview with Division of National Herbarium and Botanical garden and AUS Aid forestry expert at Ministry of forestry
April 1 Wednesday	10:00 14:00	Interview with forest program officer of WWF Information gathering at Ministry of forestry
April 2 Thursday	9:00 13:30	Interview with the director of planning department of Ministry of Agriculture Interview with the Project advisor of EU project, Interview with the program officer of Conservation International
April 3 Friday	9:00 10:00 14:00 15:00 16:00	Interview with Rural Development Advisor of RAMSI(AUS Aid) , Information gathering at MoF, Visit to Herbarium and Botanical Garden in Honiara Interview to the staff of climate change division in Ministry of Environmental Conservation and Meteorology (MECM) Interview with the National Disaster Management Office Interim reporting at the Embassy of Japan
April 4 Saturday	11:00 Afternoon	Meeting with Mr.Saso, Project Formulation Advisor of JICA Fiji Office Making of report, Data arrangement
April 5 Sunday		Making of report, Data arrangement
April 6 Monday	9:00 13:30	Interview with PS of MLHS Information collection at MoF, Planning division, Interview to PS of MoF
April 7 Tuesday	9:00 11:00 13:00	Interview with Scholl of natural resources in Solomon Islands College of Higher Education (SICHE), Interview to the climate change division in MEDM Field survey to the small scale plantation and logging sites in the forest
April 8 Wednesday	9:00 10:30 15:00 16:30	Purchase of maps at MLHS, Interview to the GIS unit Data arrangement Data collection at MoF Data arrangement
April 9 Thursday	9:30 16:00 17:30	Data collection at MoF Reporting at JICA Solomon Islands office Making of report, Data arrangement
April 10 Friday	11:30	Move from Honiara to Brisbane

Preparatory Study on the Program for Climate Change in the Pacific Islands
(Conservation of Forest Ecosystem/Environmental Monitoring)

【Solomon Islands】

6.2 Brief Features of the Proposed Projects

Inventory survey of rare/useful plants and study on their utilization and extension: Adaptation measure	
Objectives	<ul style="list-style-type: none"> ◆ To identify the rare/useful local plants and their distribution in the country ◆ To study on the culture, raising of seedlings, utilization of useful local plants in the country ◆ To propose the protected/conservation areas where the rare plants distribute
Target area	All (9) provinces in the country
Counterpart (C/P)	National Herbarium and Botanical Garden Division, Ministry of Forestry
Activities	<ul style="list-style-type: none"> ◆ Inventory survey of rare plants in the target areas. Identification of rare/useful local plants. Establishment of “Solomon Islands Rare/Useful Plants” ◆ Study on culture, raising of seedlings, utilization on rare/useful local plants ◆ Proposal on the new protected/conservation areas based on the findings of new rare/useful local plants in the inventory survey
Background of the proposal	<ul style="list-style-type: none"> ◆ Although the Solomon Islands is rich in plant resources, the studies to identify, protect and utilize the local plants were quite limited. ◆ There is a comprehensive data book on local plants, “A guide to the useful plants in the Solomon Islands” edited in 1988. Partly based on this data book, this project focus upon more practical perspectives to study the way to utilize the plant resources and develop them as a market commodity. ◆ The Government of Solomon Islands is behind in establishing the protected areas and the national parks. It is necessary to propose to the MECM and the Government based on the findings in the inventory.
Proposed schemes	<ul style="list-style-type: none"> ◆ Technical cooperation ◆ It will be implemented as regional program project. The base will be in SPC in Fiji.
Period of implementation	◆ Ten years: It will be implemented two phases (One phase is five years).

Rehabilitation of national herbarium and botanical garden in Honiara: Adaptation measure	
Objectives	<ul style="list-style-type: none"> ◆ Rehabilitation of National Herbarium and botanical garden ◆ Promotion of understanding on rare/useful plant species in Solomon Islands
Target area	All (9) provinces in the country
Counterpart (C/P)	National Herbarium and Botanical Garden Division, Ministry of Forestry
Activities	<ul style="list-style-type: none"> ◆ Rehabilitation of old buildings of national herbarium. Retrieve of rare plants specimens of Solomon Islands from USP in Fiji. Arrangement of display of plants specimens in the rehabilitated herbarium ◆ Rehabilitation of botanical gardens adjacent to the herbarium ◆ Promotion of understandings on the local plant species
Background of the proposal	<ul style="list-style-type: none"> ◆ During the ethnic tension taken place around 2000, all of the plant specimens were transferred from Honiara to USP in Fiji to avoid any losses and damages caused by the tensions. MoF has a clear intention to take those specimens back to Honiara herbarium to revive their displays. ◆ It is the first priority among all proposals of MoF submitted to the Government. It is now under discussion within the Government. The MoF unofficially discussed this issue with JICA Solomon Island Office.
Proposed schemes	<ul style="list-style-type: none"> ◆ Grant aid to rehabilitate the herbarium and botanical garden ◆ Dispatch of JOCV/JOSV in setting up the data base of local plants
Period of implementation	<ul style="list-style-type: none"> ◆ Two years for rehabilitation ◆ Two to four years for dispatch of JOCV/JOSV

Development of forestry information system and preparation of sustainable forest management plan	
Objectives	<ul style="list-style-type: none"> ◆ Forest resource assessment using the latest satellite images and ground survey. ◆ Preparation of sustainable forest management plan based on the result of the assessment ◆ Establishment of data base of forest and plantation in the country ◆ Promotion of the small scale plantation by the rural households and ◆ Institutional development to implement the sustainable forest management
Target area	All (9) provinces in the country
Counterpart (C/P)	Forest resource management & technical service division, Forest development & reforestation division, MoF
Activities	<ul style="list-style-type: none"> ◆ Development of silvicultural techniques using the indigenous tree species ◆ Assessment of forest resources using the latest satellite images and ground survey and making of operational maps based on the analysis of the images ◆ Formulation of reforestation plans based on the latest data and information in forest resource assessment ◆ Technical and institutional arrangement for promoting small scale plantation by the rural households ◆ Arrangement of data base of natural forest and plantation for sustainable planning and implementation of forestry operations ◆ Assistance in reforming the laws and regulations relating the forestry
Background of the proposal	<ul style="list-style-type: none"> ◆ In the past ten years unplanned logging was widely practice in the natural forests in all over the country, which made the natural forests more vulnerable against the adverse effects of the climate change. ◆ Forest is reproductive resources. Planning of reforestation and harvesting based on the exact information is a requisite for the sustainable forest management. ◆ Forestry Bill drafted in 2004 and Forest Policy Statement in 2006 were never implemented. Institutional reformation has been largely delayed. Urgent reformation
Proposed schemes	<ul style="list-style-type: none"> ◆ Technical cooperation
Period of implementation	<ul style="list-style-type: none"> ◆ From ten to fifteen years: It will be implemented two or three phases. ◆ Component of satellite image analysis and adaptation to forestry planning will be partly conducted in a form of regional program project. The center will be based in SPC in Fiji.

Preparatory Study on the Program for Climate Change in the Pacific Islands
(Conservation of Forest Ecosystem/Environmental Monitoring)

【Republic of Kiribati】

7.1 Schedule of the Study

Month/Day	Time	Works
April 16 Thursday	7:30	Move from Nadi (7:30) to Tarawa (10:30) FJ 231
	14:00	Making of an appointment at the President Office
	15:00	Making of an appointment at MELAD
April 17 Friday	8:30	Courtesy call to PS at the President Office
	10:00	Collection of information at Agricultural Development Division in MELAD
	11:30	Collection of information at Environmental Conservation Division in MELAD
	14:00	Collection of information at Land management Division in MELAD
	15:30	Collection of information at National Economic Planning Office in Ministry of Finance (~16:00)
April 18 Saturday		Arrangement of the collected information
		Making of the field report
April 19 Sunday		Arrangement of the collected information
		Making of the field report
April 20 Monday	Morning	Making of an appointment at KAP 2 office / Make an appointment at MELAD
	14:00	Collection of information at Environmental Conservation Division in MELAD
	15:30	Interview to the Project Manager at KAP 2 office (~16:30)
April 21 Tuesday	9:00	Collection of information at Environmental Conservation Division in MELAD
	11:30	Field survey to the central Tarawa islands (~16:00)。
April 22 Wednesday	10:20	Interview to the Project Office in MELAD
	10:50	Courtesy call to the PS of MELAD, Discussion on the proposed projects
	14:00	Interview to the JICA/JOCV coordinator in Tarawa (~15:30)
April 23 Thursday	11:30	Move from Tarawa (11:30) to Nadi (14:30) FJ 230

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(Conservation of Forest Ecosystem/Environmental Monitoring)

【Republic of Kiribati】

7.2 Brief Features of the Proposed Projects

Audio-visual education on the utilization of local plants and biodiversity conservation: Adaptation measure	
Objectives	To prepare the audio-visual programs on the utilization of local plants and biodiversity conservation
Target area	Tarawa
Counterpart (C/P)	Environment and Conservation Division, MELAD Cooperation agency: Ministry of Regional Planning, Ministry of Education
Activities	<ul style="list-style-type: none"> ◆ Selection and preparation of materials for the program ◆ Selection and procurement of audio-visual aids (video, projector, screen) ◆ Making of the scenarios for the program, filming, editing ◆ Making of the extension plan using the program ◆ Trials to show the program to the communities
Background of the proposal	<p>Followings are the Government's views relating this issue</p> <ul style="list-style-type: none"> ◆ Environmental education for the community is the top priority to maintain the biodiversity ◆ Low level of people's concern to the biodiversity conservation is the most critical setbacks against the Biodiversity Conservation Strategy. ◆ Without the environmental education, it is not possible to attain the goals of the Strategy.
Proposed schemes	<p>Combination and coordination of JICA Expert in SPC and JOCV/JOSV in Kiribati</p> <ul style="list-style-type: none"> ◆ JOCV/JOSV: Term of service will be three to six months depending on the actual volume of work. It will be renewed depending on the needs of activity. ◆ JICA Expert : To support the preparation of audio-visual education program by JOCV/JOSV in several countries in the Pacific Islands. Term of service will be more than five years.
Period of implementation	◆ Two years in total for the JOCV/JOSV based in Tarawa

IT systems and data base of MELAD: Adaptation measure	
Objectives	To set up the IT systems and Data Base of MELAD
Target area	Tarawa
Counterpart (C/P)	MELAD
Activities	<ul style="list-style-type: none"> ◆ Review of the existing data and design of the data base ◆ Instruction of data input ◆ Preparation of users manual on updating and utilization ◆ Making of the Climate Change web site in Kiribati
Background of the proposal	<ul style="list-style-type: none"> ◆ Data saving system of MELAD have not been established in MELAD, which brings about problems against the smooth implementation of administration and project works. ◆ The IT systems of MELAD have not been set up completely to connect to LAN and the Internet. It has problems which are not identified yet. IT technicians are not available in Tarawa who can solve this issue. ◆ Climate Change Unit in the Environment & Conservation Division have not started to make the "Climate Change Web Site in Kiribati" because the IT expert is not available since before.
Proposed schemes	<ul style="list-style-type: none"> ◆ JOCV: Term of service will be three to six months. It will be renewed according to the needs of works.
Period of implementation	<ul style="list-style-type: none"> ◆ Two years in total for the JOCV/JOSV based in Tarawa