Information Collecting Study on Biodiversity Conservation in Papua New Guinea

Final Report

June 2013

JAPAN INTERNATIONAL COOPERATION AGENCY

PADECO Co., Ltd.

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List of Abbreviations

ABS	Access and Benefit Sharing
AusAID	Australian Government Overseas Aid Program
CBD	Convention on Biological Diversity
CI	Conservation International
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLMA	Centre for Locally Managed Areas
COP	Conference of Parties
DAL	Department of Agriculture and Livestock
DEC	Department of Environment and Conservation
DFR	Draft Final Report
FR	Final Report
FRI	Forest Research Institute
FSC	Forest Steward Council
GCRMN	Global Coral Reef Monitoring Network
GEF	Global Environment Facility
ICDP	Integrated Conservation and Development Project
ICR	Inception Report
IUCN	International Union for Conservation of Nature
JICA	Japan International Cooperation Agency
MAB	Man and Biosphere
NCD	National Capital District
NARI	National Agricultural Research Institute
NFA	National Fisheries Authority
NGO	Non Governmental Organisation
NPAS	National Protected Area System
OCCD	Office of Climate Change and Development
PA	Protected Areas
PES	Payment for Ecosystem Services
PINBio	Papua New Guinea Institute of Biodiversity
PNG	Papua New Guinea

PNGFA	Papua New Guinea Forest Authority
PNGSDP	Papua New Guinea Sustainable Development Program Ltd.
REDD+	Reducing Emissions from Deforestation and Forest Degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries
SABL	Special Agriculture Business Lease
TEK	Traditional Ecological Knowledge
TNC	The Nature Conservancy
TPA	Tourism Promotion Authority
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNREDD	The United Nations Collaborative Programme on Reducing Emission from Deforestation and Forest Degradation in Developing Countries
UPNG	University of Papua New Guinea
USAID	United States Agency for International Development
WDPA	World Database on Protected Areas
WG	Working Group
WMA	Wildlife Management Area

Chapter 1 Introduction

1.1 Background of the Study

Papua New Guinea (PNG) is one of the areas with the richest biodiversity in the world with a territory of 462,243 km^2 in total. Owing to the varying geographical and climatic conditions of many of its islands, including the eastern half of New Guinea Island, PNG has various ecosystems, such as wide tropical rainforests in different altitudinal ranges, coral reefs, mangrove forest, woodland and savannah, etc. Among the 238 Eco-regions WWF identified on Earth, 9 of them are found in PNG. Species diversity in PNG is also rich. 6% of the plant species, which have ever recorded in the world, were discovered in PNG. One third of the species found is endemic to PNG. The north-eastern part of PNG is included in one of the 34 biodiversity hotspots identified by Conservation International. PNG is also important for its genetic diversity and is considered as one of the centres of origin of important cultivated plants, such as banana, sugar cane, sago palm, etc.

The population of PNG is 7.06 million and its population density is low in comparison with the neighbouring countries and other countries with tropical forests. However, the population has doubled in these two decades, and the rate of deforestation has accelerated for the corresponding period. Deforestation is caused mainly by commercial logging and subsistence agriculture. In addition, the money economy has been infiltrating gradually into the self-sufficient local lifestyle, and increased pressure toward development from the local communities is expected.

On the other hand, local communities in PNG are still relying heavily on the services provided by the natural ecosystems. Furthermore, the biodiversity associated with traditional knowledge of usage of the biological resources of PNG is quite valuable for people of PNG as well as the world; thus, conservation of biodiversity in PNG is quite an important national and international agenda.

At the 6th Pacific Islands Leaders Meeting held in Okinawa, Japan in May 2012, the leaders of the participating countries reaffirmed that the ecosystems, biodiversity and living resources in the Pacific region, including PNG, represented invaluable assets for the lives of Pacific people and reiterated determination to cooperate in ensuring their conservation and environmental sustainability. Prime Minister Noda of Japan underscored that Japan would continue to support the participating countries' efforts in addressing environmental issues, including conservation of maritime and forest resources. The leaders expressed appreciation for Japan's assistance to this end.

From the above background, JICA is currently considering the possibility of collaborative efforts with the government of PNG for biodiversity conservation. To contribute to the consideration, the "JICA Information Collecting Study on Biodiversity Conservation in Papua New Guinea" (the Study) was conducted.

1.2 Objectives of the Study

1.2.1 Goal of the Study

The Study aims to collect information on status and major issues of biodiversity in PNG and basic policy and effort by concerning agencies for its conservation, and to conduct comprehensive analysis of their needs for cooperation in biodiversity conservation, as reference for formulation of international cooperation projects in the future for conservation of biodiversity in PNG.

1.2.2 Areas of the Study

The study targets the whole territory of PNG including land area and sea area (within the territorial water, in principle).

1.2.3 Duration of the Study

The study period is 3 months, starting at the end of March 2013 and ending in early June 2013.

1.2.4 Outputs of the Study

The following outputs are expected from the study:

1) Information concerning biodiversity conservation in PNG is collected and consolidated.
2) Issues and needs for cooperation in biodiversity conservation in PNG are identified and points of concern for cooperation by JICA in the future are given.

1.3 Study Method

1.3.1 The Study Team Members and Their Assignments

The study team consists of two Japanese experts, namely, Jiro Iguchi, Team Leader, also in charge of Biodiversity Conservation, and Junko Toyoshima, Protected Area Management Specialist. They were assigned to the study as planned in the schedule (Figure 1-1) with minor adjustment.

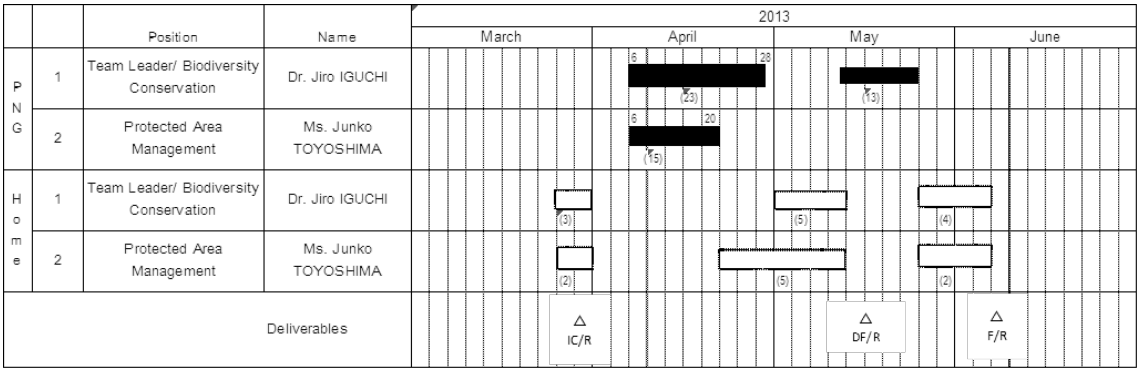


Figure 1-1 Assignment Schedule of the Experts

1.3.2 Data Collection Methods

The Team collected necessary data and information, using the following methods.

i) Review and analysis of available documents. (literature review)
ii) Interviews of the government agencies, research institutes, NGOs, donors, and other stakeholders concerning biodiversity conservation in PNG
iii) Field observation of the protected areas, such as Mt. Wilhelm National Park, Varirata National Park, Kokoda Historical (Track) Reserve and Port Moresby Nature Park

1.3.3 Schedule of the Field Surveys

The field survey was conducted following the schedules shown in Figure 1-2 and Figure 1-3.

No.	date	day	mission members		place	hotel	car	remarks
			Mr. Iguchi	Ms. Toyoshima				
1	4/7	sun	AM arrive at POM(pick up by rent-car)		POM	4 mile inn	rent-car will be arranged by the mission	phone number will be informed after arriving to ITO
2	4/8	mon	0900 JICA PNG office 1100 EOJ 1330 NRI 1500 UPNG (Environmental Science Strand)		POM	4 mile inn	sedan	
3	4/9	tue	1200 Meet with DEC Minister 1400 meeting with DEC		POM	4 mile inn	sedan	
4	4/10	wed	1000 WWF 1600 Dr. Jane Mogina (Exon Mobile)		POM	4 mile inn	sedan	
5	4/11	thu	0900 REDD+ Project Team 1000 PNGFA 1330 PNG Tourism Authority 1530 Greenpeace		POM	4 mile inn	sedan	
6	4/12	fri	0900 flight to Lae 1400 NARI 1500 FRI (Prof. Simon Saulei –mb: 72316567) 1600 UNITECH (Prof. Larry Orsak – mb: 72090916)		Lae	lae internationa l hotel	sedan	
7	4/13	sat	1015 Flight to POM PM free		POM	4 mile inn	sedan	
8	4/14	sun	0850 flight to Goroka 1100 WCS PM move to Kegsgul		Kegsugl	Camp JJ	4WD rent-car fee is paid by the mission?	>5-6hours drive to Kegsugl from Goroka >4WD car is needed for 5-6 persons >ask DEC to accompny an officer
9	4/15	mon	Site Survey at Mt. Wilhelm National Park		Kegsugl	Camp JJ	4WD	Mt. Wilhelm
10	4/16	tue	0800 move to Goroka 1300 IBR 1400 RCF 1625 flight to POM 1900 CI Director (Daikoku Restaurant Dinner)		POM	4 mile inn	4WD	
11	4/17	wed	all day: site visit to entrance of Kokoda trek, and Varirata National Park with an officer of DEC		POM	4 mile inn	4WD need a escourt service (G4S)	>ask DEC to accompany the mission and consult with Kokoda Track Authority. >Ito may accompany
12	4/18	thu	1000 PNGCLMA 1330 UNDP		POM	4 mile inn	sedan	make an appointment with secretary of DEC on 18th or 19th
13	4/19	fri	0900 National Museum 1530 intermediate report to JICA		POM	4 mile inn	sedan	
14	4/20	sat	report preparation	leaving PNG	POM	4 mile inn	sedan	
15	4/21	sun	report preparation		POM	4 mile inn	sedan	
16	4/22	mon	0830 Interview to Mr. Iwamato, JICA PNG Office 1000 USAID 1330 OCCD		POM	4 mile inn	sedan	
17	4/23	tue	1330 DEC Acting Secretary, etc.		POM	4 mile inn	sedan	
18	4/24	wed	0830 National Museum 1000 Eco-Forestry 1330 National Fisheries Authority 1500 DEC		POM	4 mile inn	sedan	
19	4/25	thu	1000 AusAID 1200 World Bank 1500 National Museum		POM	4 mile inn	sedan	
20	4/26	fri	1130 DEC 1130 Dept of Agriculture & Livestock 1330 report to JICA		POM	4 mile inn	sedan	
21	4/27	sat	1500 Departure from PNG (PX392)					

Figure 1-2 Schedule of the 1st Field Survey

No.	date	day	mission members Mr. Iguchi	place	hotel	car	remarks
1	5/13	mon	Departure from Kota Kinabalu	flying overnight			
2	5/14	tue	0800 Arrival at Port Moresby 1430 Presentation of Draft Final Report to JICA PNG Office 1530 Teleconference with the JICA Tokyo HQ at JICA PNG Office	POM	4 mile inn	sedan	
3	5/15	wed	0900 Meeting with the officers in charge and Australian expert in DEC on the Draft Final Report	POM	4 mile inn	sedan	
4	5/16	thu	0900 Meeting with Tourism Promotion Authority on the reccommendations 1030 Meeting with WWF on the reccommendations 1300 Interview to Kokoda Track Authority	POM	4 mile inn	sedan	
5	5/17	fri	0900 Meeting with the Acting Secretary of DEC of the draft report 1100 Meeting with the JICA expert for REDD+ Project on the recommendations	POM	4 mile inn	sedan	
6	5/18	sat	0900 Visit to Port Moresby Nature Park	POM	4 mile inn	sedan	
7	5/19	sun	Preparation of the Final Report	POM	4 mile inn		
8	5/20	mon	Preparation of the Final Report including application for technical cooperation	POM	4 mile inn	sedan	
9	5/21	tue	Preparation of the Final Report including application for technical cooperation	POM	4 mile inn	sedan	
10	5/22	wed	1030 Meeting with UNESCO on designationl of Biosphere Reserve under MAB 1400 Meeting with the Central Provincial Government	POM	4 mile inn	sedan	
11	5/23	thu	1100 Reporting to JICA Tokyo (tele-conference) 1330 Meeting with USAID on the recommendations 1500 Interview to UNDP on their GEF4 and GEF5 projects	POM	4 mile inn	sedan	
12	5/24	fri	0900 Meeting with DEC on the draft application form for Japan's technical cooperation 1330 Interview to National Commission for UNESCO	POM	4 mile inn	sedan	
13	5/25	sat	1500 Departure from Port Moresby	Singapore			
14	5/26	sun	Arrival at Kota Kinabalu				

Figure 1-3 Schedule of the 2nd Field Survey

Chapter 2 Biodiversity in PNG

2.1 Climatic and Geographical Condition

PNG occupies the eastern half of the island of New Guinea and many outlying islands to the north and east, with an land area of 462,243 km^2 (1.25 times of that of Japan) and an coastline of 20,197km (2/3 of that of Japan) and Sea Area/Exclusive Economic Zone (EEZ) of 3,120,000 km^2.

Lying at the collision line of the Australian and Pacific tectonic plates, PNG is remarkably diverse in terms of species, landscapes and ecosystems. PNG is extremely mountainous, with extensive areas above 3,000 m. The highest mountain, Mt. Wilhelm (4,509 m), frequently receives snow. Rainfall generally exceeds 2,000 mm annually in most areas, with some areas receiving more than 10,000 mm. Rainfall is often seasonal and some areas, particularly Western and Central provinces, have extensive dry seasons and are covered with woodland-savannah. There are more than 5,000 lakes and extensive river systems and wetlands. The species-rich mainland coastline includes more than 8,000 km of mangrove swamps, lagoons, wetlands, coral reefs and atolls, plus island archipelagos and hundreds of offshore islands.

2.2 Diversity of Ecosystems

2.2.1 Terrestrial Ecosystems

According the PNG's Fourth National Report submitted to the Convention on Biological Diversity (Government of PNG, 2010), PNG is divided into 9 ecologically appropriate eco-regions within which biodiversity is to be represented (Figure 2-1, Table 2-1). The eco-regions are defined as relatively large units of land containing a distinct assemblage of natural communities and species, with boundaries that approximate the original extent of natural communities prior to major land-use change.

In the report, DEC with The Nature Conservancy (TNC) delineated more accurate boundaries for the ecoregions by matching them with Land System boundaries by: (a) aggregating adjacent archipelagos; (b) subsuming coastal units and small, upland ecoregions within their surrounding lowland ecoregions; (c) and aggregating the southern plains, wetlands and savannah ecoregions whose boundaries could not be consistently delineated. The number of ecoregions was reduced from 15 ecoregions originally identified by WWF to 9.

Source: Government of PNG (2010)

Figure 2-1 Ecosystems in PNG in an Ecoregional Context

Table 2-1 Ecosystems in PNG in an Ecoregional Context

Ref	Ecoregions	Size (Hectares)	%	Source WWF Ecoregion
1	Manus Island	208,505	0.5	132. Admiralty Islands
2	North-eastern Islands	4,699,775	10.2	111. New Britain/New Ireland Lowlands 112. New Britain/New Ireland Uplands
3	Bougainville Island	939,137	2.0	119. Bougainville Island
4	Northern New Guinea	9,482,056	20.5	107. Huon Range 115. North New Guinea Lowlands 116. North New Guinea Uplands
5	Central Range	11,821,294	25.5	105. Central Range
6	Southeast Peninsula	7,457,004	16.1	120. Southeast Peninsula
7	Trobriand Island	432,689	0.9	125. Trobriand Islands
8	Louisiade (South-eastern Island)	181,395	0.4	110. Louisiade Archipelago
9	Southern New Guinea	11,053,974	23.9	121. Southern Wetlands 122. Southern Plains 708. Trans-fly
		46,275,829	**100%**	

Source: Government of PNG (2010)

2.2.2 Marine Ecosystems

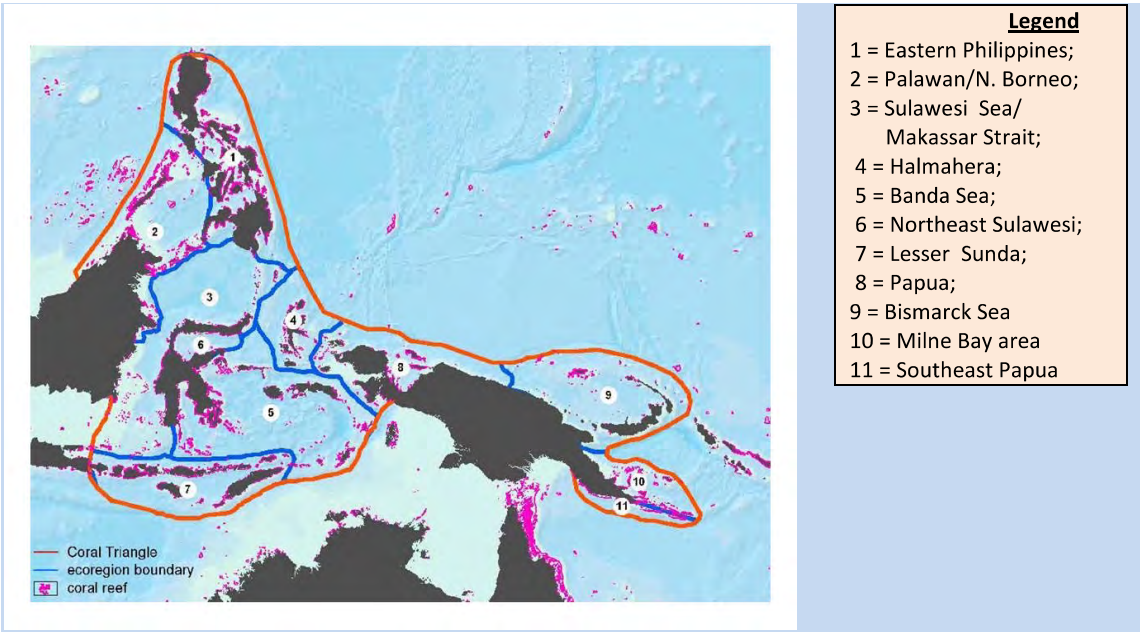
PNG is surrounded by three major water bodies; the Bismarck Sea (north), the Solomon Sea (west), and the Coral Sea (south). The marine environment is comprised of coastal ecosystems (e.g. coral reefs, mangrove forests, and sea grass beds), continental self, and open ocean. It is estimated that total area of coral reefs in PNG is 40,000km^2.

In the PNG's Fourth National Report submitted to CBD (Government of PNG 2010), similar to the terrestrial environment, an eco-region approach was adopted to map out the marine environment. However, the boundaries of an eco-region are not fixed or well-defined, but rather encompass an area within which important ecological and evolutionary processes most strongly interact (Figure 2-2). As a result, they classified PNG marine environment into three eco-regions namely: -

1. Bismarck Sea –including the island of Manus, New Britain, New Ireland and north coast of the Momase region.
2. Milne Bay Area – including the areas from Lae to Milne Bay Province excluding the south east of the province,
3. Southeast PNG – including the southeast coast line from Port Moresby to the further east to the Sudase Island in the Milne Bay Province.

The other two possible, unclassified eco-regions missing from the above are:

4. Bougainville Island in the Solomon Seas, and
5. Southwest PNG – far west of Port Moresby including the Gulf of Papua and the Torres Strait area



Source: Government of PNG (2010)

Figure 2-2 Boundaries of the Ecoregions within the Coral Triangle

2.2.3 Inland Water and Mangrove

There are number of important wetland ecosystems and these are:

- North of the central cordillera is a catchment of the Sepik River in the west and by the Ramu River to the east. The Sepik and Ramu Rivers discharge to the Bismarck Sea in a wide gap between the Torricelli and Adelbert ranges
- The Markham River occupies the eastern part of this great northern catchment, and is an unusual river for PNG being a shelving stream for most of its length.
- To the south, in the western part of PNG, is a huge low-lying land drained by the Fly river, Strickland river, Purari River etc. in Gulf and Central Provinces. The coastal plains are swampy areas traversed by meandering rivers with associated oxbow lakes.

Mangrove swamps occupy 574,867ha hectares (~2% of the forest estate). They are normally found along protected bays and near the mouths of rivers and are especially abundant along the south coast in the Gulf of Papua into which several large rivers flow (e.g. the Fly, Kikori and Purari). The extent of mangroves in the Gulf of Papua has remained relatively stable for nearly 40 years, with expansion in some areas balanced by regression in other areas. There are 33 species of mangrove trees known from Papua New Guinea. This flora, which includes 16 genera and 13 families of plants, constitutes the highest mangrove diversity in the world (Shearman et al., 2008).

2.2.4 Global Ecoregions

The Global Ecoregions is a science-based global ranking of the Earth's most biologically outstanding terrestrial, freshwater and marine habitats. It provides a critical blueprint for biodiversity conservation at a global scale, developed by WWF scientists in collaboration with regional experts around the world. At present, 238 Global Eco-regions are identified in the world, among which 9 are found in PNG which are as follows: -

- Bismarck-Solomon Seas
- Central Range Subalpine Grasslands
- Lakes Kutubu and Sentani
- New Guinea Mangroves
- New Guinea Montane Forests
- New Guinea Rivers and Streams
- Northern Australia and Trans-Fly Savannas
- Solomons-Vanuatu-Bismarck Moist Forests
- Southern New Guinea Lowland Forests[1]

2.3 Species Diversity

2.3.1 Estimated Number of Species

The total number of different plants and animals in PNG is not accurately known but almost certainly exceeds 200,000 species and thus is far higher than the 26,318 which are described (Table 2-2). Scientists estimate that more than half the plants and animals found in PNG have yet to be scientifically named.

The flora of PNG is poorly known. Estimates for the number of vascular plant species for the entire island of New Guinea range from 11,000 - 16,203, based on species-area relationships and publishing trends, to 20,000 - 25,000 species (including undescribed taxa) calculated on the

[1] http://wwf.panda.org/about_our_earth/ecoregions/ecoregion_list/ecoregions_country/ecoregions_country_p.cfm

assumption that orchid and fern species, which are relatively well known, comprise about a quarter of the overall flora. About 6% of the world's flora is found in PNG. Endemism probably exceeds 30% for PNG and is well over 70% for Papuasia (i.e, most species that are not endemic to the country of PNG are endemic to Papuasia – the SW Pacific region from New Guinea to the Solomon Islands).

PNG harbours a rich array of animals including 276 species of mammals (69 endemic), 643 species of amphibians and reptiles (328 endemic), 740 species of birds (600 resident; 77 endemic), 341 species of freshwater fishes (82 endemic) and estimated 150,000 species of insects. Overall approximately a third of the species are endemic to PNG and more than 70% are endemic to Papuasia.

Concerning endangered species, the current status of species in PNG includes: 1 extinct, 36 critically endangered, 49 endangered, 365 vulnerable, 288 near threatened, 1,289 Least Concern.

It is important to note that there are large gaps in the scientific knowledge of PNG's biodiversity. The number of frog species, currently 302, will likely be doubled by the time all species have been discovered and scientifically named. The number of species of reptiles and mammals is also expected to significantly increase as these taxa become better known.

Table 2-2 Estimated Number of Described and Assessed Species

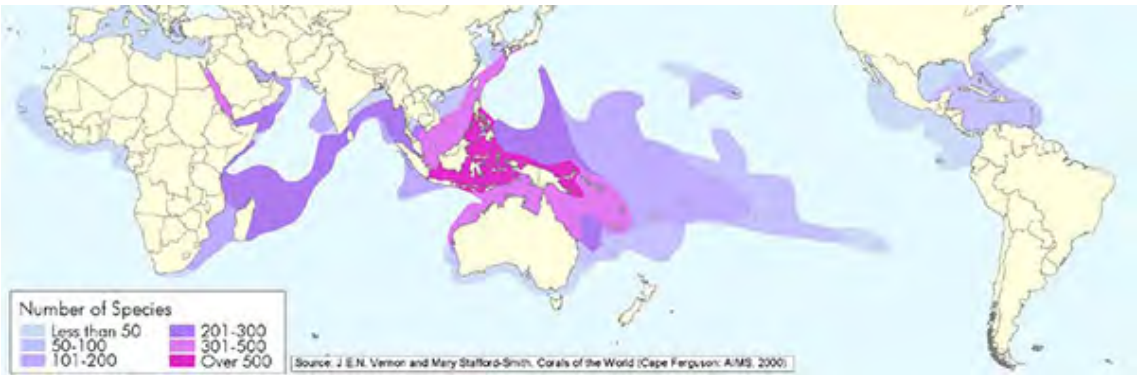
Taxonomic Group	Sub group	Estimated number of species described*	Number of Species Assessed	Revised Estimates from Bishop Museum's Pacific Bilogical Survey
Plants	Mosses	1286 1	**1**	
	Ferns	2414		
	Cycads	10	**6**	
	Conifer	110	**33**	
	Dicots	8278	222	
	Monocots	4367	2	
	Algae	189	**0**	
	Fungi	2240		
Total Plants		**18894**	**264**	
Birds		**719**	**719**	**740**
Mammals		**271**	**271**	**276**
Reptiles		**227**	**16**	**341**
Amphibians		**266**	**266**	**302**
Fish	Marine	2719	170	2800
	Fresh-water Fish	341	**0**	**314**
Total Fish		**3060**	**170**	
Invertebrates	Insecta	1644	22	150000 – 200000
	Arachnids	**8**	**0**	**~1500**
	Hard Corals	560	560	~600
	Molluscs (Bivalves and Gastropods)	669	7	~3000
	Crustaceans	**Unknown**	15	Unknown
	Hydrozoans	**Unknown**	6	Unknown
	Other	**Unknown**		Unknown
	Invertebrates			
Total Invertebrates		**2881**	**610**	
Totals		**26318**	**2316**	

Source: Government of PNG (2010)

2.3.2 Marine Species

The coral reefs of PNG have a high conservation value due to high biodiversity and relatively pristine status. PNG waters are considered part of the coral triangle, (Figure 2-2) the area of the world's highest known marine biological diversity. Its coral reefs and associated marine habitat are home to about 2,800 species of fishes, about 10% of the world total. Almost all reef types found in PNG waters are within fringing and/or barrier reefs, with an estimated area of 40,000 km^2. In addition, PNG has some of the largest unpolluted tropical freshwater systems in the Asia Pacific region.

Although poorly studied, the coral reefs of PNG are known to be the most diverse reef systems in the world, especially those along the northern coast (Figure 2-3). The total number of coral species in PNG is unknown, although about 400 species have been reported. About 650 species of corals are recorded in the western Pacific region (northern Australia to Japan) by a coral taxonomist Dr. J. E. N. Veron, and most of these species are likely to exist in PNG waters. Studies on other marine invertebrate species in the Madang lagoon and vicinity area also indicated the highest species richness in the world. As for the fishes, there are well over 3,000 species known in the region, including over 300 species found in freshwater habitats.



Source: Tropical Research and Conservation Centre
(http://tracc-borneo.info/environments/coral-reefs/coral-reef-biodiversity/)

Figure 2-3 Diversity of Reef-Building Corals in the World

2.3.3 Megadiversity Country, Biodiversity Hotspot and Important Bird Area

PNG is one of the 17 Megadiversity Countries identified by Conservation International which harbour more than 70% of the earth's species.

The islands of New Britain, New Ireland, Manus and Bougainville in PNG are included in the East Melanesian Islands Hotspot, one of the 34 Biodiversity Hotspots in the world identified by Conservation International with 3,000 species of endemic plant species, 33 endemic threatened birds, 20 endemic threatened mammals and 6 recorded extinct species (Figure 2-4). BirdLife International identifies 13 Endemic Bird Areas in PNG[2].

[2] http://www.birdlife.org/datazone/country/papua-new-guinea/ebas

Source: Conservation International[3]

Figure 2-4 East Melanesian Hotspot

2.4 Plant Genetic Resources for Food and Agriculture

PNG is the secondary centre of genetic diversity for sweet potato, taro, banana, yam, cassava and aibika. The diversity of these crops includes more than 1000 sweet potato, 800 taro, 200 banana, 300 yam, 100 cassava and 100 aibika landraces or farmer cultivars that are currently being conserved under *ex situ* collections. Additionally, PNG is blessed with a broad genetic base of food crops that provides for tolerance against major pests and diseases. This means that crops are at less risk of being lost through attacks by pests and diseases unlike those with a narrower genetic base. The conservation and safe keeping of the genetic diversity of food crops is important for food and nutritional security for our current and future generations (Government of PNG, 2009).

PNG is home to many exotic and under-utilized fruits and nuts species and traditional vegetables. It is also a rich haven for crop genetic resources diversity and the centre of origin for 'noble cane' (sugar cane) and winged bean of New Guinea. Apart from the staple crop species mentioned above, most under-utilized crop species are found in the wild habitats and in farmers' fields and home gardens. They are harvested only when needed and usually these crop species provide food during the time when garden foods are in short supply (Government of PNG, 2009).

Some of these crop species are still collected from the wild habitats. Occurrences of many species are limited to certain locations due to changes that are now taking place due to the effect of the climate change. The wild stands of fruits and nut tree species are declining in some areas of the country due to limbering and logging activities. These species also provide very good timber and are removed for their timber quality (Government of PNG, 2009).

2.5 Population Relying on Biological Resources

According to census taken place in 2011 (NSO, 2012), population of PNG in 2011 was 7,059,653. Its population density is only about 15 people per square km (less than 1/20 of that in Japan), but its population growth rate is high (2.3%) and its population has been doubled in these twenty year.

[3] http://www.conservation.org/where/priority_areas/hotspots/asia-pacific/East-Melanesian-Islands/Pages/default.aspx

Throughout humans' long existence on the mainland and islands, PNG's forests have served a vital role in maintaining the health and well-being of the majority of the population and providing them with the means to live and, more recently, generate income. Over 80% of the population of PNG are still directly dependent on the local environment for their subsistence and livelihoods. Forests contribute a rich variety of foods and other items essential for daily survival and economic activity, and form fertile soils for subsistence food production through the process of shifting cultivation or 'swidden' agriculture (Shearman et al., 2008).

More than five hundred species of plants have been identified in use as food in PNG, the vast majority growing wild in either primary or secondary forest. In total, more than one thousand species of PNG's plants have been identified that are used for food, medicine, ropes, building materials, stimulants, body decoration and adornment, art, utensils and canoes (Shearman et al., 2008).

Hunting is still a major activity for many people in rural PNG and forms an important part of customary practice. Recent research suggests that between 4.14 and 7.9 million vertebrate animals, comprising 10.95 to 20.90 million kilograms of biomass, are consumed each year across the country. These animals are mostly obtained from forests. They would amount to a retail replacement value (in town, ignoring transport costs to rural areas) of approximately 75 million kina annually (US$26 million) for either tinned fish or lamb flaps – the cheapest source of meat. In coastal areas a wide variety of seafood, including fish, molluscs, and turtles, dominate local diets (Shearman et al., 2008).

Commercially-valuable non-timber forest products include resins, gums, meat for food, oils, sandalwood and rattan. Forest-related commercial opportunities exist for butterfly farming, insect farming, orchid production, crocodile hunting and deer, fish and cassowary farming as well as handicrafts and adventure and eco-tourism. The forests of Papua New Guinea also hold a yet unassessed value in terms of their biodiversity, gene pools, potential educational services and pharmaceutical uses (Shearman et al., 2008).

2.6 Ecosystems Services

PNG's forests perform a number of crucial ecological functions, the importance of which often tends to be underestimated and unrecognised. The broad range of these free services includes regulation of water catchments and enhancement of water quality; global, regional and microclimate stabilisation; soil and nutrient retention; insect and rodent control; crop pollination; and the maintenance of fish stocks (Shearman et al., 2008).

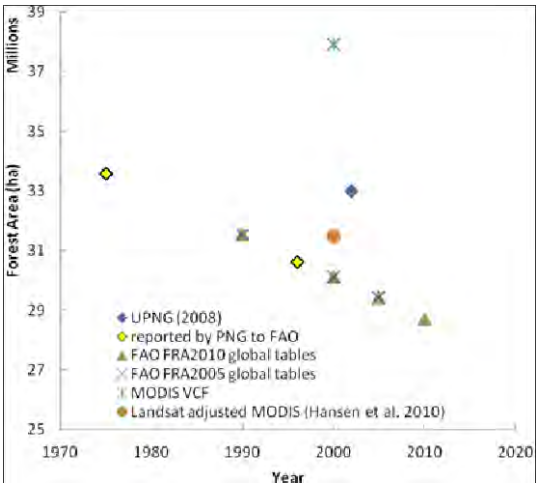
Intact and healthy forests are vital in maintaining the integrity and health of the country's river catchments and for preserving water supplies and quality. Their functions include protection of watersheds, regulating water flows, maintaining soil formation, reducing local flooding and supplying high quality water by filtering silt and pollutants. Forested catchments supply drinking water, habitats for plants and animals, areas of natural beauty and water bodies that provide important food and energy sources. The maintenance of forests is thus strongly linked to the health and quality of life of PNG's citizens (Shearman et al., 2008).

PNG's landscape is dominated by forested river catchments, which are fed by heavy rainfall averaging more than 8,000 mm annually in parts of the central ranges and up to 7,000mm in the Islands region. Virtually all of PNG's fresh water flows via forest rivers and lakes and from forest-derived water tables. The quality of the water flowing into PNG's coastal seas and the amounts of organic and inorganic matter transported from land to sea are governed to a considerable extent by the state of the forests in each watershed (Shearman et al., 2008).

Forests also perform a crucial role in coastline protection and the quality and productivity of fisheries in PNG's coastal seas and to some extent those of its neighbours. By filtering fresh water and controlling sedimentation and erosion, PNG's forests maintain the conditions necessary for the development of fringing coral reefs, seagrass beds, estuarine wetlands and lush mangrove forests, which provide important breeding and nursery habitats for freshwater and marine species, and protect the shoreline and land from storm and wave damage (Shearman et al., 2008).

2.7 Deforestation and Its Causes

The island of New Guinea as a whole (combining mainland PNG and Indonesia's West Papua region) is the largest contiguous area of forest in Asia-Pacific and the third largest tropical rainforest on the planet, after the Amazon and Congo forests. Rainforests cover 28.2 million hectares of PNG and comprise 80% of the forest estate (Shearman et al., 2008). The rest of the forest estate comprises dry evergreen forest, swamp forest, and mangroves. The total forest estate covers approximately 71% of the land area of PNG. The remaining non-forest area includes extensive areas of lowland to mid-montane grassland (much of which may be anthropogenic), subalpine and alpine shrubland and grassland, human settlements, and water bodies (Shearman et al., 2008). Winrock International (2011) compiled estimates of forest covers in PNG in different points of the past from several data sources such as the FAO Forest Resources Assessment (FRA) 2010, a more recent survey of PNG's forests was completed in 2008 by the University of Papua New Guinea (UPNG) Remote Sensing Centre, etc. (Figure 2-5).



Source: Winrock International (2011)

Figure 2-5 Trends in Forest Cover Over Time in PNG According to Multiple Data Sources

Table 2-3 shows trend of forest area and its annual change rate in PNG in comparison with those in Indonesia, Brazil, Congo which have big areas of rainforest comparable to PNG and the world citing from FAO (2010). In 1970s to 1980s, in comparison with rapid decrease of tropical rainforest in Southeast Asia and Amazon, the forest in PNG was considered to be less threatened by forest degradation. However, at present the annual deforestation rate of PNG is comparable with those of Brazil and Indonesia and far beyond the global average. FAO (2010) also reported that PNG, which has the largest area of primary forest in the Oceania region, had the largest loss of primary forest during the period of 1990-2010, indicating that it has been particularly prevalent in the last decade. The rate of loss of primary forest is stable or decreasing in all regions in the world except Oceania, where it is increasing primarily as a result of a higher reported loss from PNG.

Table 2-3 Trend in Extent of Forest in PNG and Other Countries with Tropical Forest

Country/ area	Forest area (1,000 ha)				Annual Change rate					
	1990	2000	2005	2010	1990-2000		2000-2005		2005-2010	
					1,000 ha/yr	%	1,000 ha/yr	%	1,000 ha/yr	%
PNG	**31,523**	**30,133**	**29,437**	**28,726**	**-139**	**-0.45**	**-139**	**-0.47**	**-147**	**-0.49**
Indonesia	118,545	99,409	97,857	94,432	-1,914	-1.75	-310	-0.31	-685	-0.71
Brazil	574,839	545,943	530,494	519,522	-2,890	-0.51	-3,090	-0.57	-2,194	-0.42
Congo	160,363	157,249	155,692	154,135	-311	-0.20	-311	-0.20	-311	-0.20
World	4,168,399	4,085,168	4,060,964	4,033,060	-8,323	-0.20	-4,841	-0.12	-5,581	-0.14

Source: FAO (2010)

To achieve Target 5 of Aichi Biodiversity Targets, such as "By 2020, the rate of loss of all natural habitats, including forests, is at least halved and, where feasible, brought close to zero, and degradation and fragmentation is significantly reduced," slowing down the deforestation rate in PNG is critical.

Shearman et al. (2008) conducted the study of forest change across PNG records that extensive and rapid deforestation and forest degradation have occurred over the thirty years from 1972 to 2002[4]. The major causes of deforestation and forest degradation over the thirty years in PNG have been logging (48.2% of net forest change) and subsistence agriculture (45.6% of net forest change), with lesser causes being fires (4.4%), plantations (1.2%) and mining (0.6%). In addition, the most significant findings of the study are as follows: -

- Change in the extent and condition in PNG's forests is occurring considerably faster than previously recorded – it is estimated that in 2002, 1.41% of PNG's tropical forests were being deforested or degraded annually.
- Expansion of subsistence agriculture was the major driver of deforestation between 1972 and 2002, accounting for 45.6% of the net forest change recorded across the country. An estimated 3.6 million hectares, 11% of the area of intact forest in 1972, had been cleared as a result of garden expansion or subsistence-related activity by 2002.
- By 2002 primary forests accessible to mechanized logging were being degraded or cleared at the rate of 2.6% per annum. In 2001, approximately 362,400 hectares of these forests were deforested or degraded. Of the 1972 commercially accessible forest area, it is estimated that by 2021, 83% will have been cleared or degraded if current trends continue.
- Forests are being logged repeatedly and wastefully, with little regard for forest ecology, ecosystem functions or silvicultural practices which reduce impact and enhance regeneration. Across the Mainland lowland and Islands regions, logged forests have in many locations been reduced to a state that is highly vulnerable to further degradation and eventual conversion.
- The management of PNG's forestry industry has paid little attention to the concept of sustainability in planning forest management and accessing forest land, nor to measures to ensure low impacts, good silvicultural practices, biodiversity conservation, equitable access and sharing of benefits from resource exploitation.
- The area of PNG's globally important montane forests has been significantly reduced through burning, largely associated with fires occurring during periods of drought.

[4] Currently more recent trend of deforestation and forest degradation is being analyzed utilizing satellite images in 2011 by PNGFA under the JICA assisted REDD+ Project.

- Current conservation measures, through forest management practices or site or species protection, are inadequate. Neither the formal protected areas system (Wildlife Management Areas and National Parks), nor local efforts to combine conservation and resource-based development activities, supported by land-owners, conservation organisations and the national government's conservation agency, have safeguarded the forest resources they encompass.

This report concludes by advocating substantial reforms to PNG's forest and land management regime, stressing the urgent need for PNG to strengthen natural resource governance, support for local landowners and community initiatives, sound silvicultural practices, biodiversity conservation and integrated catchment management. Such changes will provide a framework in which PNG can begin to realize its own National Goals as set out in its Constitution (See Section 4.1.1).

The above analysis by Shearman et al. (2008) was focused on the deforestation and forest degradation occurred over the thirty years from 1972 to 2002. Thus, degradation and deforestation after 2003 is not covered. On the other hand, as stated in Section 3.1.2 below, since 2003, the number of Special Purpose Agriculture Business Leases (SABL) issued has rapidly increased. The lease holders under the SABL were allowed to log the land for the purpose of agricultural development with far less rigor process than that of logging concessionaires, which lead to its use to access lumber and skirt the normal logging concession processes. The log export has also increased since 2003. However, the recent trend of deforestation and forest degradation and its relationship with the increase of SABL since 2003 have not yet been studied properly.

2.8 Deterioration of Marine Ecosystems and Its Causes

According to "The Status of the Coral Reefs In the World 2004", a report compiled by Global Coral Reef Monitoring Network (GCRMN), most coral reefs in PNG were in good condition as of 2004, with particularly high biodiversity and scenic beauty. However, some reefs near the large towns of Port Moresby, Madang and Lae and others in more remote locations, such as Kimbe Bay and Milne Bay, showed clear signs of damage. As most reefs are fringing reefs that are very close to shore, they are highly sensitive to human influences and changes in land management practices (mining, logging, plantations, etc.). Major local-scale threats to the reefs are over-fishing, sediment runoff from land clearing and mining, pollution from urbanization (such as untreated sewage) and outbreaks of coral predators such as crown-of-thorns starfish. Unsustainable fishing practices include illegal fishing, overfishing, uncontrolled by-catch, and oil spills from ships. Dynamite fishing is illegal but still practiced in small scale. The reefs are also declining due to global threats such as global warming, coral bleaching, and ocean acidification. Unlike other parts of the world which are visited by a large number of recreational divers (e.g. Australia, Japan, etc.), tourism overuse does not seem to be a serious threat in PNG yet.

Coastal mangrove forests in some areas are being degraded and fragmented through unsustainable exploitation for firewood and building materials. Therefore, UNDP and some NGOs are collaborating for coastal mangrove conservation through community empowerment and replanting of mangrove trees (See Section 6.4).

Target 10 of Aichi Biodiversity Targets is "By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning." In PNG with an estimated area of 40,000 km^2 of coral reefs, management of the threats to the reefs will greatly contribute to achieving the target.

Chapter 3 Socio-economic Conditions Affecting Biodiversity

3.1 Industries and Their Impacts on Biodiversity

3.1.1 Forestry

As stated in Section 2.7, according to Shearman et al. (2008), forestry operations are confirmed as the main driver of overall forest change in PNG, responsible for deforestation of 0.9 million hectares and degradation of a further 2.9 million hectares of primary forest between 1972 and 2002. This amounts to the clearance or degradation of 11.5% of the country's 1972 forest estate, and 48.2% of the country's net forest change.

Commercial logging in PNG has been heavily concentrated in forest areas that are accessible by bulldozers, trucks and coastal shipping. The forestry industry in PNG is based overwhelmingly on the mechanized extraction of unprocessed logs for export by harvesting natural forest areas, principally old-growth stands where trees are usually hundreds of years old. There is very little timber milling or manufacturing of local timber products in PNG.

Typical logging operations in PNG involve selection and felling of trees on the basis of species and diameter, cutting the bole into suitable lengths and dragging the raw logs to logging trucks and barge transport. The practice of most logging operations in PNG over the past few decades can be described as "selective removal of all saleable trees." The first logging event leaves trees of smaller size or lesser value, which may then be targeted for "salvage logging," the term used to describe the removal of inferior trees, or after a few decades, of trees that escaped removal in the first logging event. Salvage logging further degrades the remaining forest.

The logging operation itself causes substantial destruction to the forest in the form of roading and collateral damage from tree felling. Typically, the collateral damage and roading impacts are even greater than the impacts of tree removal. Gap formation and loss of a closed canopy can cause rapid drying of the vegetation, making it more prone to wildfire. Logged forests are especially vulnerable to the invasion of weeds that can inhibit regeneration. It is also likely that logged areas are more susceptible to high winds and to landslides as a consequence of changes in soil hydrology. Shade-dependent understory species are adversely impacted by the removal of the canopy.

Most logging operations result in a substantial alteration in the forest composition and structure and the categorization of logged forest as 'degraded' is an appropriate classification. Regrowth forest has a greater proportion of fast-growing, short-lived, low-density, non-commercial species. Fast-growing species that might have been restricted to forest edges and gaps (river banks, landslides or tree fall gaps) tend to proliferate at the expense of slow-growing species.

The ecological effects of selective logging on PNG's rainforest community are largely unquantified and poorly documented. In other tropical regions, logging practices similar to those in PNG, where the forest is degraded but not cleared completely, have been documented to cause severe damage to the forest habitats and ecology, including damage to soils, substantial carbon emissions, and increased vulnerability to both fire and subsequent conversion to grassland, scrub or agricultural lands. What is known about the ecology of PNG's forest suggests that repeated logging within a short period also predisposes the area to grass invasion, fire and eventual conversion to scrub and grassland.

3.1.2 Agriculture

As stated in Section 2.7, Shearman et al. (2008) found that substantial agriculture is the other main driver of overall forest change in PNG. Shifting cultivation has nibbled at New Guinea's

forests for thousands of years. At very low population densities, gardens remain isolated and revert to forest after cultivation ceases. Swidden systems in tropical regions have been shown to actually enhance biological diversity by maintaining significant portions of forest at differing stages of succession. However, this does not hold true at higher population densities, when increased demand for food leads to reduced fallow cycles and garden areas being expanded and becoming connected, which facilitates the spread of fire. Above a critical population density, there is no fallow or forest regeneration and the land is permanently in some form of agricultural use.

PNG's population grew exponentially between 1972 and 2002, from approximately 2.7 million to 5.6 million, and reached 7.06 million in 2011, increasing the demand for food and saleable produce from gardens. This has been observed to lead to shortening of the swidden cycle, which in turn results in the clearance of primary forest and, in some cases, to the unintended conversion of secondary forests into grassland disclimax communities (Shearman et al., 2008).

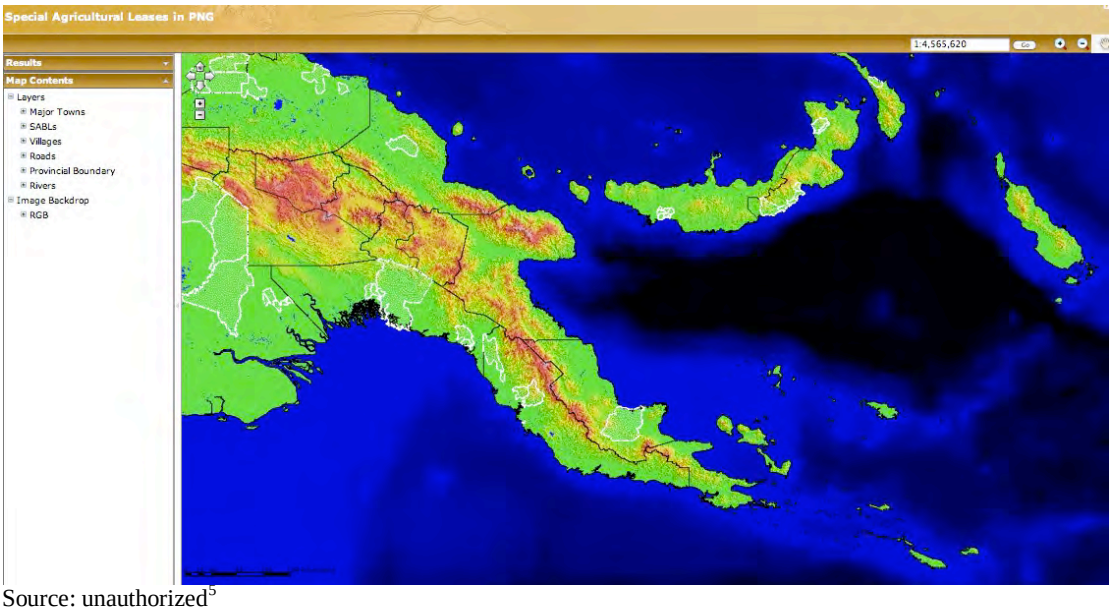
Besides the above mentioned substantial agriculture, in 2002 there was a total area of 149,402 hectares under plantations in PNG. Over 90% (135,843 ha) of this area was oil palm plantations, located mostly in West New Britain, Milne Bay, Oro and New Ireland. Clearing of forests for plantations was an important cause of change in some fertile lowland rainforests. The extent of these areas is relatively small compared to the impacts of commercial logging and subsistence agricultural expansion on the national forest estate. Nevertheless, the figures are under-estimates of the impacts associated with oil palm development as they do not include the impact of increased settlement and agriculture as a result of people migrating to and living around the plantations (Shearman et al., 2008). The government has planned for substantial growth in production of the four main export crops (palm oil, coffee, cocoa, and copra) over the next twenty years. Oil palm alone is expected to grow by 5-6% per year (Winrock International, 2011). Recently, some palm oil companies in PNG have become members of the "Roundtable on Sustainable Palm Oil" (RSPO).

3.1.3 Impact of Special Purpose Agriculture Business Lease (SABL)

During the interview by the study team, many stakeholders of biodiversity conservation in PNG expressed their apprehension towards negative impact of agricultural development based on lease-leaseback scheme called "Special Purpose Agriculture Business Lease" (SABL).

Section 11 of the *Land Act 1996* applies to the granting of a lease to the State of land for the purposes of the Minister granting a lease under section 102 of the *Land Act* for SABL. This section and the use of it to grant SABLs has come under much scrutiny in recent years and has been the subject of a Commission of Inquiry which is yet to hand down its findings (O'Brien, 2012).

The number of SABL issued since 2003 have rapidly increased. These leases, which skirt the usual negotiation process as applied under Forest Management Agreements (FMA, as stated in Section 4.5.1), can cover areas of land in excess of 100,000 hectares. It is currently believed that over 5.2 million hectares have already been issued (Figure 3-1) with an additional 7-8 million hectares pending – though they are on hold due to a government-issued moratorium (Winlock International, 2011).



Source: unauthorized[5]

Figure 3-1 Areas with SABL Issued

Granting of SABLs may allow acquisition of customary land for agricultural development. There are several significant problems with the current SABL process, including:

- Landowners (often based in Port Moresby) claiming to represent communities negotiate leases with the Government without the consent of the communities;
- Tenders have been granted to agricultural companies without first checking their expertise or financial support, or even the feasibility of the proposed developments;
- Forest Clearance Authorities are granted to lease holders under the SABL process with far less rigor than is applied to logging concessionaires, leading to its use to access lumber and skirt the normal logging concession processes; and
- A general lack of transparency at all stages.

According to Greenpeace (2012), PNG log exports grew by almost 20 per cent in 2011 almost entirely due to logging within SABLs. Since 2006, logging companies have exported over 1.5 million cubic meters of whole logs from SABLs, amassing over K290 million (USD 145 million) for the Malaysian companies mostly involved. Almost all these logs were exported to China.

3.1.4 Mining

The development of mines in PNG has had intense local impacts on the country's forests, land and waterways, but the area of forests affected directly has been small, totalling 0.2% of the 1972 forest area, with most of this occurring in Western Province (48,061 ha). However, this figure is almost certainly a significant under-estimation of the impacts of mining developments

[5] The source of image is the web page below managed by "Act Now!" an internet community to ensure people's voice in PNG.
http://actnowpng.org/content/new-interactive-website-shows-villages-affected-sabl-land-grab
The same images are cited in some other websites managed by non-governmental organizations. They indicate the source of the image as http://www.pngsdf.com/sabl the page in an interacting mapping website managed by UPNG Remote Sensing Centre, though the page does not exist at present.

on PNG's forests, which are known to include increases in clearance for gardens in order to generate produce for use by the mines and their associated communities (Shearman et al., 2008).

3.1.5 Fishery

In PNG, subsistence or artisanal fishing activities are practiced by local people in the coastal communities, but these are not for commercial purposes. Although there is a potential for overfishing, most of this type of fishing activities are thought to be managed in a sustainable level. These fishing activities are managed by the communities themselves by setting up Locally Managed Marine Areas (LMMAs) with the support of NGOs or local level government.

On the other hand, PNG is an exporter of some commercial species such as tuna, lobster, and sea cucumbers. These types of fishing activities are practiced by commercial enterprises under the national regulation. National Fisheries Authority (NFA) is in charge of fishery management and national management plans are formulated for the species with high commercial values. The management plans include licensing, total allowable catches, and other requirements for operators for environmentally safe practices, such as measures to reduce by-catches.

3.1.6 Tourism

Tourism is a growing and important part of the PNG economy. According to PNG Tourism Promotion Authority (PNGTPA), the tourism revenue is estimated to be 1 billion Kina, producing 15,000 fulltime jobs nationwide (Figure 3-2). Tourism is particularly important as a source of alternative livelihood for communities in rural areas. In the recent years, PNG tourism has grown at a rate higher than the global and regional average. Tourism industry in PNG is largely dependent on natural resources and biodiversity since main tourism attractions are nature-based activities such as diving, trekking, and bird watching. Cultural diversity is another main tourism attraction and community-based tourism has high development potential. Therefore, it is given high priority in the national tourism development policies and the importance of environmental conservation is well recognized by the tourism sector. However, tourism growth in PNG is challenged by fragile security situation in the country and susceptibility to global economic climate. (For example, number of tourist arrivals from Japan was significantly reduced after the country was hit by a major earthquake event in March 2011.)

Source: PNGTPA

Figure 3-2 Number of Tourist Arrivals in 2011/2012

3.2 Traditional Ecological Knowledge (TEK) and Biocultural Diversity

Agricultural biodiversity or genetic diversity of useful crop species is deeply related to traditional ecological knowledge. For example, the sweet potato is a central component of the PNG diet, and an estimated 5,000 cultivars of this staple are found within the country. Numerous other plant species have traditionally been cultivated, including more than 30 root crops, 21 legume species, 40 leafy green vegetables, 60 other vegetables and roots, 43 varieties of nuts, 102 fruits, and 89 other plants used for food or for seasonings. This traditional knowledge has already been tapped by the outside world: the winge-bean (*Psophocarpus tetragonolobus),* which is nutritionally similar to the soybean and is an important part of the diet in PNG forest regions, is now cultivated in some 50 developing countries (DEC, 1993).

Biocultural diversity is an important concept that must be considered in conservation and utilization of biodiversity as well as development of the Access and Benefit Sharing (ABS) framework. It covers a whole host of topics and issues. Topics such as coevolution of cultural linguistics and biodiversity, the value of ecological knowledge, threat to indigenous knowledge and cultural perception of ecological interactions are all embraced by this concept. It should be noted that PNG is rich in biodiversity, as well as in cultural diversity, and they are interrelated. The human population of PNG makes up a small fraction of the world's total (approx. 0.1%) but represents more than 12% of the world's languages.

Other discussions highlight immediate consequences of losing local knowledge and information. Loss of certain local information or knowledge could be life threatening in particular communities. The pressures of development are causing an alarming increase in the rate of loss in biodiversity. Many species will become extinct before societies even know about them. More action is needed to re-vitalize, maintain and document traditional ecological knowledge in PNG.

Target 18 of Aichi Biodiversity Targets is "By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels." The status in PNG, such as the much traditional knowledge and rich bicultural diversity relatively well conserved as well as the strong protection of rights of indigenous people in PNG as stated below may provide a chance for Government of PNG to demonstrate a model to contribute to the Target.

3.3 Customary Land Tenure

PNG is mostly covered by customary land which is owned by customary landholders who are grouped into clans and tribes. These customary landholders own 97% of the land while the State owns only about 3% (Table 3-1). The challenge for land use as well as biodiversity conservation in PNG is developing an appropriate strategy which enables appropriate access and conservation of the biological resources located on customary land and at the same time ensures that customary landowners gain maximum benefit from the sustainable use and conservation of the resources. The formulation of such a strategy would require innovative ideas and firm action from all stakeholders.

Table 3-1 Land Tenure in PNG

Category	Area	Remarks
Customary Land	97%	Land of which ownership and/or usage by indigenous inhabitants of PNG are stipulated by their customs (customary law)
- Special Purpose Agriculture & Business Leases（SABL）	（11%）	Granting of a lease to the state of land stipulated in Section 11 of *Land Act 1996* originally aiming to facilitate a coconut or oil palm small holder plantation. The number of SABL issued since 2003 have rapidly increased and they were misused to clear fell land for agriculture schemes which do not exist, skirting usual process for timber concession. These leases are now on hold being the subject of a Commission of Inquiry which has not delivered its findings.
- Registered Clan Land	N/A	Land registered under the *Land Registration (Amendment) Act 2009*. Only an Incorporated Landowner Group (ILG) can apply for registration. Smaller family units than clans which might have direct control over their customary land are denied the right to make an application. Once registration takes effect, the land ceases to be bound by customary entitlements. The amendment aims to change the old system where only a few shareholders of landowner company registering land get benefits. After passage through the Parliament in 2009, the Act laid for over three years before being signed into operation only in March 2012.
- Wildlife Management Area - Conservation Area	(4.1%)	Though they are legally protected areas, the tenure is still with customary landowners.
Alienated Land - Freehold Land - State Owned Land - Land where government is the root of a leasehold title - National Parks (on State land or leased land)	3%	Land alienated from customary land through various legal schemes

Source: JICA PNG Office, O'Brien (2012)

Effective protected area system in PNG should be also consistent with the unique customary land tenure. The National Parks Act is of limited value in PNG today as it relies upon alienation of customary land tenure by the State. This is unlikely to occur. Protected areas in PNG are primarily developed on customary land tenure and implicitly involve the community giving up rights over their land in terms of acceptable land use practices. As stated in Section 4.3.3, the discussion paper on a protected area policy (DEC 2011) concluded that the national protected area system (NPAS) will be developed primarily on customary land tenure and landowners will continue to live in and utilize the natural resources within the protected area.

3.4 Lessons Learnt from the Past Integrated Conservation and Development Projects (ICDPs) in PNG

Integrated Conservation and Development Projects (ICDPs) or Projects of Integrated Conservation and Development (ICADs) began in Africa and India in the 1980s (after the failure of exclusion of "encroachment" in many protected areas). The general aim of an ICDP is to provide local resource owners with an alternative to selling off their timber resources, by enabling them to develop their own resource-based livelihoods and achieve a sustainable balance between local economic development and resource conservation. Such approaches take

a variety of different shapes with widely different scales of operations and modes of participation. What they have in common is that they tie the development interests of local resource owners with the conservation interest of the donor. By forging explicit linkages between environmental management and income generating activities, the economic benefits derived from an intact environment captures local people, thus reducing the incentive to seek more destructive alternatives. In PNG, such "linked" activities usually take the form of biological research activities, eco-tourism, eco-forestry and the harvesting and selling of various non-timber forest products.

From their origins in Africa and India, ICDPs spread to PNG. However, the fundamental difference was that elsewhere ICDP methods were generally used to reduce the pressure on existing protected areas, while in PNG such methods were used to establish protected areas. The ICDPs became very popular in a short period of time. By the late 1990s there were at least ten different types of ICDPs in the country, such as: -

- The Hunstein range Project, supported by WWF International and the East Sepik Council of Women (East Sepik Province);
- The Kuper Range Project, run by The Wau Ecology Institute (Morobe Province);
- The Lakekamu-Kunimaipa Basin ICDP, run by the Foundation for the Peoples of the South Pacific, the Wau Ecology Institute and Conservation International (Central and Gulf province);
- The Maisin ICDP, run by Conservation Melanesia and Greenpeace, in Collingwood Bay (Oro Province);
- The Lasanga ICDP, run by the Village Development Trust, in Lasanga (Morobe Province);
- The Crater Mountain ICDP, sponsored by the Research and Conservation Foundation and the Wildlife Conservation Society-USA (Eastern Highlands, Gulf and Simbu Provinces);
- The Oro Butterfly Project, backed by the PNG Department of Environment and Conservation and AUSAID (Oro Province);
- The Kikori Basin ICDP, run by WWF-USA (Gulf and Southern Highlands provinces);
- The Lak ICDP, backed by the PNG Department of Environment and Conservation and the UNDP (New Ireland Province); and
- The Bismarck-Ramu ICDP, backed by the PNG Department of Environment and Conservation, the Christensen Research Institute and the UNDP (Simbu and Madang Provinces) (Anderson, 2004).

According to Shearman et al. (2008), it has proved difficult for ICDPs in PNG. The projects tended to become too complex and expensive, requiring numerous outside experts and substantial management and administrative infrastructure. Their complexity made them risky, and most appear to have not lived up to expectations. Some ICDPs simply paid local people to not use a resource, sometimes in the form of a grant to develop a business venture, or as compensation. Most ICDPs did not last for more than a few years.

One of them, the Lak Project (1993-95) supported by DEC and the UNDP in New Ireland Province was officially assessed by the UNDP as a failure (Anderson, 2004, World Bank, 1998). It was evaluated as failure because a planned large biodiversity conservation area was not created, and logging followed the delivery of a range of incentives to landowners, intended to help them stop the logging. The lessons included an awareness that: ICDPs and their material incentives could create dependency and passivity on the landowners; cooperative endeavour, "partnerships" and "participation" are easily spoken of but may often be superficial; landowner attitudes towards conservation are critical; and logging companies had a comparative advantage in dealing with local communities in the PNG political climate. There

were also many problems with the material incentives to compensate communities for opportunity costs approach in Lak, including the generation of unrealistic expectations of "cargo" (goods and services arriving from oveerseas)[6] amongst local people, and the fact that ICDPs cannot compete with mining or logging companies in the provision of immediate material benefits to communities. ICDP should not play the same game as the loggers by basically paying off people.

On the other hand, some ICDPs managed to get new protected areas and new small business enterprises started. Importantly, ICDPs supported local participation, education programs, communal decision-making and planning processes that, if sustained, would be likely to deliver conservation and sustainable development in the long term.

A foreign expert who has 25 year long experience in nature conservation in PNG, including technical assistance to ICDP, commented that there has been huge a risk in utilizing immediate economic incentives to motivate local community for conservation. He also stressed that awareness of the value of biodiversity and ecosystems through environmental education to foster their pride in them is a more secured option to motivate the local community towards conservation though it may take more time.

After the Lak Project, the Bismarck-Ramu ICDP (1995-1999) assisted by UNDP began in an area more protected from the imminent threat of logging (and large scale cash cropping) but suffered from many of the same problems. Members of the Lak and Bismarck-Ramu projects were left dissatisfied with the design of the ICDP, which began by separating “conservation” from the “development” needs of the communities. Such an approach, it was felt, could not be truly driven by the landowners themselves. As a result several of the project team departed from the method and eventually created the Bismarck-Ramu Group (BRG), breaking away from the PNG Government and the UNDP. BRG rapidly established its independent status. BRG generally stress the Melanesian nature of their approach and indeed in their village work there is constant emphasis on the value of customary relationships, on building self-reliance and on an environmental management based on traditional principles.

After the general failure of the 1990's ICDPs (the above Bismarck-Ramu ICDP is rare exception which produced sustainable BRG), and subsequent decline of PNG-NGOs focused on conservation, the tendency was for the international NGOs to largely remove themselves from the community interaction challenges, and instead focus on biodiversity surveys. While the results of these surveys definitely contribute to knowledge on biodiversity in PNG, they do very little to achieve on-the-ground conservation in the absence of the sustained community interactions.

[6] A cargo cult is a kind of Melanesian millenarian movement encompassing a diverse range of practices and occurring in the wake of contact with the commercial networks of colonizing societies. The name derives from the apparent belief that various ritualistic acts will lead to a bestowing of material wealth ("cargo").

Chapter 4 Legislation, Policies and Plans for Biodiversity Conservation

4.1 Mainstreaming Biodiversity Conservation

4.1.1 Consideration of Biodiversity Conservation in Development Planning

Papua New Guinea's strong position on the environment is drawn from the Preamble of their National Constitution such as:

"We declare our fourth goal to be for Papua New Guinea's natural resources and environment to be conserved and used for the collective benefit of us all, and be replenished for the benefit of future generation."

The PNG government agencies are sector driven. It is confusing when different agencies related to biodiversity are implementing and enforcing the various sectorial policies and legislation that they administer for the purpose of biodiversity conservation. At the same time, there are key agencies and registration supporting mainstreaming biodiversity conservation in national planning as shown in Table 4-1. Besides legislations and agencies for protected areas and the concerning sectors described later, the table identifies the Organic Law on Provincial and Local-Level Governments (OLPG&LLG) that provides an important institutional framework for the planning process in PNG. It provides the foundation for a system of bottom-up planning for provinces, to ensure the delivery of better and more appropriate services to the local people in a more efficient manner (Government of PNG, 2010).

Table 4-1 Key Government Agencies and the Legislation that Promotes Mainstreaming Biodiversity Conservation in National Programme

Agency	Responsibility	Legislation	Section	Level
National Planning and Monitoring	▪ National Planning Guidelines and policies development ▪ Financial and management and monitoring	▪ OLPG&LLG 1995 ▪ OLPG&LLG 1995 ▪ OLPG&LLG 1995 ▪ OLPG&LLG 1997	✓ S25 ✓ S33A ✓ S38 ✓ S34	✓ Provincial ✓ District ✓ LLG ✓ Ward
Dept. Lands & Physical Planning	Lands	▪ Physical Planning Act 1989	Part VII Section 67	✓ National ✓ Provincial
Department of Environment and Conservation	Environment & Conservation (Protected Areas) on Terrestrial and Marine	▪ Fauna(Protection & Control) Act	Part IV, V & VI	✓ National
		▪ Conservation Areas Act	Part III Section 12-17	✓ National
		▪ National Parks Act	Section 4 & 5	✓ Provincial ✓ National
		▪ Environment Act 2000	Part 5, Division 1 Section 41	✓ National
National Forest Authority	Forest	▪ Forest Act	Part III, Section 48 Section 49	✓ National ✓ Provincial
National Fisheries Authority	Fisheries	▪ Fisheries Act	Part III, Section 28	✓ National ✓ Provincial
Department of Mining	Mining	▪ Mining Act	Section 3 Section 7 & 8	✓ National

Source: Government of PNG (2010)

4.1.2 Absence of Integrated Land-Use Planning

Necessity of country-wide land-use planning with integrated manner of development in various industrial sectors (forestry, agriculture, mining, etc.), community development and biodiversity conservation is repeated in recent reviews of the legislation and policies for biodiversity conservation in PNG.

Shearman et al. (2008) stated "How much of PNG's land should be converted to such production forests, affecting which areas, which catchments, and which communities? What proportion of each type of PNG's unique forest should be conserved and how are these areas best protected from logging, burning, and clearance for agriculture, plantations or other developments? These questions are best answered through adequate country-wide land-use and development planning processes."

Such integrated country-wide land-use planning is also required for effective protected area management. As stated in Section 4.3.3, Department of Environment and Conservation (DEC) drafted a discussion paper on a protected area policy and one of the main conclusions drawn in the paper is "Whole-of-government land-use planning processes are required to ensure coordinated decision making regarding allocation of land and marine areas to resource development or conservation purposes."

Concerning deforestation and forest degradation caused by the misuse of SABL (Section 3.1.3), Greenpeace (2012) recommended development of land-use plan as follows: -

- Seek international assistance to begin a process to develop a National Land Use Plan that has the participation of all relevant stakeholders, especially customary landholders, and with key objectives of protecting customary land rights and maintaining forest resources for future generations of Papua New Guineans.
- Declare a moratorium on all new forestry and agricultural approvals over forested land until the agreed National Land Use Plan has been implemented.

4.2 National Biodiversity Strategy and Action Plan

Responding to the requirement of CBD, Government of PNG formulated and launched National Biodiversity Strategy and Action Plan (NBSAP) in 2007. This document is central to all the programs, projects and activities that PNG has developed or been involved in respect to biodiversity conservation. The following are the main goals of the NBSAP: -

Goal 1: To conserve, sustainably use, and manage the country's biological diversity

Goal 2: To strengthen and promote institutional and human capacity building for biodiversity conservation, management and sustainable use

Goal 3: To strengthen partnership and promote coordination for conserving biodiversity

Goal 4: To strengthen existing protected areas and ensure that protected areas for terrestrial species and marine species are increased to 10% by 2010 and 2012 respectively

Goal 5: Ensure a fair and equitable sharing of benefits arising from genetic and ecosystem resources

Goal 6: Promote and strengthen research of the country's biological diversity and sustainable development of the country's biological resources

It was planned to achieve these Goals through nine (9) broad programmes over the following five (5) years and beyond.

However, according to the Fourth National Report to CBD (Government of PNG, 2010) the implementation of NBSAP has been slow, uncoordinated, and without proper funding and capacity allocated. The NBSAP requires urgent review and needs to take into consideration ways of incorporating the below aspects appropriately: -

1. Articulations and alignment of the national priorities with CBD requirements,
2. Formation of an institutional arrangement to coordinate implementation of the NBSAP,
3. Development of a national biodiversity conservation policy,
4. Improve implementation and resource mobilization strategy for the NBSAP,
5. Institute the Biosecurity Act and the Biosafety Policy Framework
6. Institute a legal regime to protect intellectual property rights of organizations and individuals involved in biodiversity research and development
7. Establishment of partnerships with NGOs, local communities and the donors
8. Application of best management practices in Protected area – including the development of management Plans for Protected Areas
9. Limited resources within DEC to support implementation of the NBSAP
10. Absence of a sustainable financing mechanism to support conservation work in PNG
11. Lack of a policy to guide nation for strategies on invasive species

Since the formulation of the NBSAP, a number of major government development policies and plans have been formulated which have implication of the progress and achievements of its goals and objectives. These include:

1. Vision 2050
2. Development Strategic Plan
3. Medium-Term Development Strategy
4. DEC Corporate Policy especially the Environmentally Sustainable Economic Growth Policy
5. Climate Compatible Development Plan
6. Millennium Development Goal 7 (MDG7)

Although DEC has led the preparation of the NBSAP, it has not been able to fully implement many of the activities because of resource and capacity constraints. The DEC is also implementing a new Corporate Plan (2010-2013) to create new administrative structure more capable of implementing sectoral environmental planning. However, the NBSAP is yet to be reviewed and does not incorporate the new DEC Corporate Plan or either of the new national strategic plans. Thus, DEC recognizes the need to review and update the NBSAP to make it consistent with the new plans. According to UNDP, NBSAP will be reviewed this year (2013) with their assistance.

4.3 Protected Area Management

4.3.1 Laws on Protected Areas

According to DEC (2011), there are three laws at the national level enabling gazettal of protected areas for biodiversity conservation purpose, such as: -

- National Parks Act
- Fauna (Protection and Control) Act
- Conservation Area Act

(1) National Park Act

The National Parks Act was a pre-Independence regulation. It was legislated in 1982. It provides for the establishment of protected areas on State owned land which are alienated lands acquired from the customary owners by mutual agreement or compulsory acquisition.

The objective of the National Parks Act is twofold. It is intended to provide for the preservation of the environment and national heritage by: (1) the conservation of sites and areas having a particular biological, topographical, geological, historical, scientific or social importance; and (2) the management of those sites and areas, in accordance with the fourth goal of the National Goal and Directive Principles.

The total area of existing parks and reserves gazetted under the National Parks Act is less than 10,000 ha. Since independence, the practice of alienating land for the purpose of the State has substantially declined and the current pressure is more on converting State owned land to customary tenure.

(2) Fauna (Protection and Control) Act

The Fauna (Protection and Control) Act targets the control and management of certain fauna species which are protected under the Act. It originates from the Fauna (Protection and Control) Regulation of 1968 and inherits goals set for sporting purpose (hunt for game).

This Act targeting certain fauna is small in scope and does not recognize the importance of protecting habitats or ecosystems or even plant species, the main food resource for many animal species.

The Act also allows for the establishment of sanctuaries, protected areas and Wildlife Management Areas (WMAs). However, the Act is not a traditionally protected area act where biodiversity conservation is the primary focus of the gazetted area. Protected areas are declared only for a specific class of protected fauna, while WMAs are established for classes of protected fauna. Notwithstanding this point the vast majority of protected areas in PNG have been established under the Act as WMAs. They now comprise more than 90% of protected area coverage in PNG.

The WMAs are managed by the landowners and government through the Wildlife Management Areas Committees. Wildlife Management Committees manage and formulate rules relating to the WMA. The Act has very weak regulatory provisions and essentially provides the framework for landowners to manage the area, including setting rules for wildlife management, with the Government having little or no power to intervene in the event of over-exploitation of fauna resources.

(3) Conservation Areas Act

The objective of the Conservation Areas Act is similar to those of the National Parks Act. PINBio (2004) states that this situation occurred probably as a result of the fact that the National Parks Act was still a pre-Independence regulation. However, the Act is unique in aiming at conservation of areas located on customary land. The National Parks Act is aimed at State land and customary leased land, whereas, the Conservation Areas Act targets customary land.

While the above mentioned Fauna (Protection and Control) Act empowers the State to use protected fauna as a pretext to declare customary land as protected areas (usually after paying compensation), the Conservation Areas Act empowers the landowners to make decisions about their land themselves.

The Act purports to transfer significant property rights from landowners to the Government following gazettal of the Conservation Area and gives significant powers to the Minister in the event landowners wish to undertake development on their land. The Act appears to rely on Section 53 (*protection from unjust deprivation of property*) of the Constitution, which recognizes that protection of the environment for the purpose of preservation is a public purpose, to prevent landowners from claiming compensation for the implicit transfer of property rights to the Minister following a Conservation Area gazettal.

The Act also provides for the creation of a National Conservation Council to advise the Minister on matters relating to the establishment and management of protected areas. The Conservation Areas Act is also the only Act which requires broad consultation and an National Executive Council's (NEC) decision on gazettal of the protected area.

4.3.2 Existing Protected Areas in PNG and Their Status

Figure 4-1 locates major protected areas, while Table 4-3 indicates outline of each protected area. PNG's current terrestrial protected areas together cover approximately 4.1% of PNG's land area (Table 4-2). Among 61 protected areas gazetted the above mentioned three legislations, Wildlife Management Areas (WMAs), now comprise more than 90% of protected area coverage, while the total area of existing parks and reserves gazetted under the National Parks Act is less than 0.5%. Only one Conservation Area, Yus Conservation Area in Morobe Province has been declared under Conservation Areas Act, which comprises 4% of protected area coverage. Out of 57 protected areas in PNG listed in Table 4-3, two are designated as marine protected areas and additional 12 have marine and terrestrial components. The largest marine protected area is Maza Wildlife Management Area (184,230 ha) in Western Province.

Though the protected areas are to be legally managed by DEC, its monitoring and management activity on the ground is minimal. The Study Team identified only two rangers assigned by DEC to the protected areas (one in Varirata National Park and the other in Kokoda Track). Shearman et al. (2008) analyzed 34 designated protected areas and found that outside of the two of the most recently-designated big WMAs, the other 32 WMAs are experiencing clearance and degradation at rates comparable with the rest of the country during the period of 1972-2002. Given that they are generally not under the management of the government, there is little reason to expect any difference. Large areas of some WMAs have been logged and much of their unlogged area has been allocated to the logging industry. Thus, they strongly suggested that the current system of protected areas is ineffective on a number of levels.

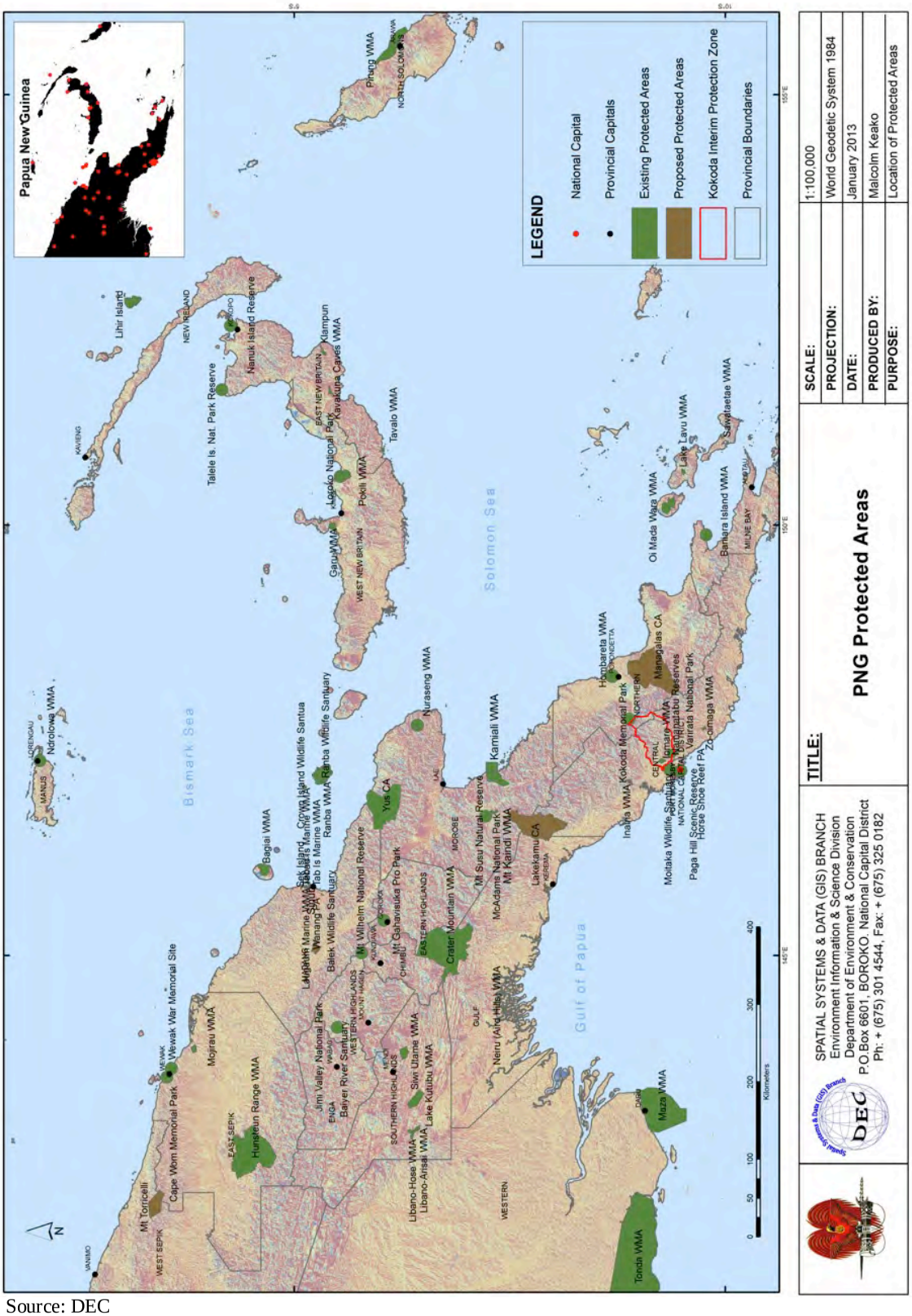
In addition, the protected areas contain only a very small proportion of PNG's forest, and this area is disproportionately located in the lower montane forest; the forest that has been least affected by logging and subsistence clearance. The protected area network has not been designated with the rationale of protecting representative examples of forest types in the various ecoregions.

Table 4-2 Number, Type and Area of Protected Area in PNG

Legislation	Type	No.	Area (Hectares)	%
Fauna (Protection and Control) Act	Wildlife Management Area	38	1,723,773	90.8
Fauna (Protection and Control) Act	Sanctuary	5	75,271	3.9
Fauna (Protection and Control) Act	Protected Area	2	20,245	1.1
Conservation Areas Act	Conservation Area	1	76,000	4.0
National Parks Act	National Park	8	8,059	0.4
National Parks Act	Provincial Park	1	77	0.004
National Parks Act	Reserve	3	49	0.003
National Parks Act	Memorial Park	3	5	0.0003
	Total	**61**	**1,897,595**	**100**

Source: DEC (2011)

Target 11 of Aichi Biodiversity Targets is "By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes." The current figure of 4.1% of terrestrial protected areas in PNG is far below the targeted 17%, more effort by Government of PNG and external assistance is needed to increase protected areas as well as establishing a model of proper management of the protected areas in their unique conditions.



Source: DEC

Figure 4-1 Locations of Protected Areas in PNG

Table 4-3 List of Protected Areas in PNG

	NAME	PROVINCE	MARINE OR TERRESTRIAL	LEGISLATION & SECTION	TENURE 1	TENURE 2	LONGITUDE	LATITUDE	LATITUDE BioRap Coverage	LONGITUDE BioRap Coverage	GAZETTAL REMARKS	SIZE (ha)	DECLARATION DATE	GAZETTE NO.	GAZETTAL DATE
1	Bagiai Wildlife Management Area	Madang	MARINE / TERRESTRIAL	Fauna (Protection and Control) Act 1966 Section 21A & 21B	Customary Land		145.9900	-4.6500			Gazette Located	13,760.00	13-Jan-77	G07	27-Jan-77
2	Baiyer River Sanctuary	Western Highlands	TERRESTRIAL	Land Ordinance 1962-1967.	State Land		144.1600	-5.5000			Gazette Located	741.00	13-Jan-68	PNGG 7	8-Feb-68
3	Balek Wildlife Sanctuary	Madang	TERRESTRIAL	Fauna (Protection and Control) Act 1966 Section 17(1)	Customary Land		145.7100	-5.3200	147.2600	-9.2600	Gazette Located	470.00	21-Jul-77	G61	4-Aug-77
4	Baniara Island	Milne Bay	TERRESTRIAL	Fauna (Protection and Control) Act 1966 Section 20	Customary Land		150.6100	-10.6300	144.266666666670000	-5.266666666666700	Gazette Located	200.00	31-Jan-75	G09	13-Feb-75
5	Cape Wom Memorial Park	East Sepik	TERRESTRIAL	Lands Ordinance 1962-1971 & National Parks Ordinance 1966-1971 Sect 27 & 28 (LO) Sect 12 (NPO)	State Land		143.5800	-3.5100	147.1100	-7.3100	Gazette Located	165.42	8-Oct-73	G95	18-Oct-73
6	Crown Island Wildlife Sanctuary	Madang	MARINE / TERRESTRIAL	Fauna (Protection and Control) Act 1966 Section 17(1)	Customary Land		147.1200	-5.1200	146.000000000000000	-4.666666666666700	Gazette Located	58969	21-Jul-77	G61	4-Aug-77
7	Crater Mountain Wildlife Management Area	Eastern-Madang- Simbu-Gulf	TERRESTRIAL	Fauna (Protection and Control) Act 1966 (Chapter 154) Section 15 & 16	Customary Land		145.1100	-6.7800	144.166666666670000	-5.500000000000000	Gazette Located	270000	16-Nov-93	G96	25-Nov-93
8	Garu Wildlife Management Area	West New Britain	TERRESTRIAL	Fauna (Protection and Control) Act 1966 Section 21A & 21B	Customary Land		149.9900	-5.4500	145.716666666670000	-5.316666666666700	Gazette Located	8,700.00	26-Nov-76	G97	9-Dec-76
9	Hombareta Wildlife Management Area	Oro	TERRESTRIAL	Fauna (Protection and Control) Act (Chapter 154) Section 15 & 16	Customary Land		150.6200	-10.6300	150.616666666670000	-10.633333333333000	Check gazette proper	130.00	5-Mar-97	G16	6-Mar-97
10	Horse Shoe Reef	Central	MARINE									395.90			9-Jun-81
11	Hunstein Range Wildlife Management Area	East Sepik	TERRESTRIAL	Fauna (Protection and Control) Act (Chapter 154) Section 15 & 16	Customary Land		143.5800	-3.5100	143.583333333330000	-3.516666666666700	Gazette Located	220000	8-Oct-73	G100	13-Nov-97
12	Iomare Wildlife Management Area	Central	TERRESTRIAL	Fauna (Protection and Control) Act (Chapter 154) Section 15 & 16	Customary Land		147.2600	-9.2600	146.958333333330000	-5.083333333333300	Gazette Located	3,827.00	7-Nov-87	G81	24-Dec-87
13	Jimi (Ruti) Valley National Park	Western Highlands	TERRESTRIAL	National Parks Act (Chapter 157) Section 4	State Land		144.3200	-5.3100	145.083333333330000	-6.583333333333300	Gazette Located	4,180.00	25-Oct-91	G93	31-Oct-91
14	Kamiali Wilglife Management Area	Morobe	MARINE / TERRESTRIAL	Fauna (Protection and Control) Act (Chapter 154) Section 15 & 16	Customary Land		147.1100	-7.3100	150.383333333330000	-5.250000000000000	Gazette Located	47,413.00	6-Aug-96	G77	19-Sep-96
15	Kavakuna Caves Wildlife Management Area	East New Britain	TERRESTRIAL	Fauna (Protection and Control) Act 1966 (Chapter 154) Section 15 & 16	Customary Land						Gazette Located		22-Apr-97	G33	1-May-97
16	Klampun Wildlife Management Area	East New Britain										5,200.00			4-Sep-03
17	Kokoda Memorial Park	Central	TERRESTRIAL		State Land						No gazette Located		Check gazette proper		24-Sep-81
18	Kokoda Historic (Track) Reserve	Oro-Central	TERRESTRIAL		Customary Land						No gazette Located		Check gazette proper		Unknown
19	Lake Lavu Wildlife Management Area	Milne Bay	TERRESTRIAL	Fauna (Protection and Control) Act 1966 Section 21A & 21B	Customary Land		150.6200	-9.5100	150.600000000000000	-9.533333333333300	Gazette Located	2,640.00	17-Feb-81	G18	5-Mar-81
20	Lake Kutubu Wildlife Management Area	Southern Highlands	TERRESTRIAL	Fauna (Protection and Control) Act 1966 Section 15 & 16	Customary Land		143.3300	-6.4100	143.333333333330000	-6.416666666666700	Gazette Located	4,924.00	29-May-92	G52	25-Jun-92
21	Laugum Marine WMA	Madang	MARINE	Fauna (Protection and Control) Act 1966 (Chapter 154) Section 15 & 16								72.95			26-Jan-06
22	Libano-Arisai Wildlife Management Area	Southern Highlands										3,964.00			7-Feb-08
23	Libano-Hose Wildlife Management Area	Sothern Highlands										7,736.00			7-Feb-08
24	Lihir Island	New Ireland	TERRESTRIAL	Fauna Act (Chapter 154) Section 13 & 23	Customary Land	Mining Lease	152.6000	-3.0800	152.600000000000000	-3.083333333333300	Gazette Located	1,980.00	29-May-91	G52	6-Jun-91
25	Loroko National Park	West New Britain	TERRESTRIAL	Lands Act (Chapter 185) Section 25	State Land		150.5600	-5.5300	150.566666666670000	-5.533333333333300	Gazette Located	100.00	24-Sep-91	G87	10-Oct-91
26	Maza Wildlife Management Area	Western	MARINE / TERRESTRIAL	Fauna (Protection and Control) Act 1966 Section 21A & 21B	Customary Land		143.4100	-9.0000	143.416666666670000	-9.000000000000000	Gazette Located	184230	7-Dec-78	G99	21-Dec-78
27	Mc Adams National Park	Morobe	TERRESTRIAL	Lands Ordinance 1922-1961of the Territory of New Guinea Section 68 & 72	State Land		146.6700	-7.3000	146.666666666670000	-7.283333333333300	Gazette Located	2,081.00	12-Feb-62	G9	22-Feb-62
28	Moitaka Wildlife Sanctuary	National Capital District	TERRESTRIAL		State Land		147.2000	-9.4500	147.200000000000000	-9.450000000000000	No gazette Located	42.00	Check gazette proper		27-Jul-1989 G49
29	Mojirau Wildlife Management Area	East Sepik	TERRESTRIAL	Fauna (Protection and Control) Act 1966 Section 21A & 21B	Customary Land		143.9200	-3.8300	143.866666666670000	-3.783333333333300	Gazette Located	5,079.00	2-Jun-78	G54	22-Jun-78
30	Mt Gahavisuka Provincial Park	Eastern Highlands	TERRESTRIAL	Lands Act (Chapter 185) Section 25	State Land		145.4100	-6.0400	145.400000000000000	-6.016666666666700	Gazette Located	77.40	6-Jul-89	G49	27-Jul-89
31	Mt Kaindi Wildlife Management Area	Morobe	TERRESTRIAL	Fauna (Protection & Control) Act 1966 Section 15 & 16	Customary Land		146.6800	-7.3100	146.700000000000000	-7.350000000000000	Gazette Located	1,502.00	15-Feb-90	G16	15-Mar-90
32	Mt Susu Natural Reserve	Morobe	TERRESTRIAL				146.6200	-7.2200	146.616666666670000	-7.233333333333300	No gazette Located	260.00	Check gazette proper		Unknown
33	Mt Wilhelm National Park	Simbu	TERRESTRIAL	Natural Lands Registration Act (Chapter 357) Section 11	State Land		145.0300	-5.7800	145.033333333330000	-5.783333333333300	Gazette Located	817.00	4-May-90	G28	17-May-90
34	Namanatabu Reserves	Central	TERRESTRIAL		State Land		147.3500	-9.4000	147.350000000000000	-9.400000000000000	No gazette Located	29.00	Check gazette proper		15-Mar-1979 G41
35	Nanuk Island District Park	East New Britain	TERRESTRIAL	Lands Ordinance 1962-1971 & NP Ordinance 1966-1971	State Land		152.3300	-4.1600	152.333333333330000	-4.166666666666700	Gazette Located	12.00	26-Nov-73	G111	6-Dec-73
36	Ndrolowa Wildlife Management Area	Manus	MARINE / TERRESTRIAL	Fauna (Protection and Control) Act (Chapter 154) Section 15 & 16	Customary Land		147.2600	-2.0500	147.266666666670000	-2.050000000000000	Gazette Located	5,850.00	28-Mar-85	G16	28-Mar-85
37	Neiru (Aird Hills) Wildlife Management Area	Gulf	Wetlands / TERRESTRIAL	Fauna (Protection and Control) Act 1966 (Chapter 154) Section 15 & 16	Customary Land		144.3700	-7.4300	144.333333333330000	-7.433333333333300	Gazette Located	3.98	7-Nov-87	G81	24-Dec-87
38	Nusareng Wildlife Management Area	Morobe	TERRESTRIAL	Fauna (Protection and Control) Act 1966 (Chapter 154) Section 15 & 16	Customary Land		141.5700	-8.9500	147.766666666670000	-6.500000000000000	Gazette Located	22.23	16-Sep-86	G63	9-Oct-86
39	Oi Mada Waa Wildlife Management Area	Milne Bay	TERRESTRIAL	Fauna (Protection & Control) Act 1966 Section 21A & 21B	Customary Land		150.2400	-9.3600	150.250000000000000	-9.416666666666700	Gazette Located	22840	30-Jul-81	G62	6-Oct-81
40	Paga Hill Scenic Reserve	National Capital District	TERRESTRIAL	Lands Act (Chapter 185) Section 25	State Land		147.1500	-9.4800	147.150000000000000	-9.483333333333300	Gazette Located	13.12	17-Jan-87	G59	10-Sep-87
41	Pirung Eight Islands Wildlife Management Area	North Solomons	MARINE / TERRESTRIAL	Fauna (Protection and Control) Act 1966 (Chapter 154) Section 15 & 16	Customary Land		155.6600	-6.2500	155.666666666670000	-6.250000000000000	Gazette Located	43200	9-May-89	G33	25-May-89
42	Pokili Wildlife Management Area	West New Britain	TERRESTRIAL	Fauna (Protection and Control) Act 1966 Section 21A & 21B	Customary Land		150.5800	-5.6000	150.583333333330000	-5.616666666666700	Gazette Located	9,840.00	11-Jun-75	G50	26-Jun-75
43	Ranba Wildlife Management Area	Madang	MARINE / TERRESTRIAL	Fauna (Protection and Control) Act 1966 Section 21A & 21B	Customary Land		147.1100	-5.3300	147.116666666670000	-5.333333333333300	Gazette Located	41922	16-Jun-77	G54	30-Jun-77
44	Ranba Wildlife Sanctuary	Madang	TERRESTRIAL	Fauna (Protection and Control) Act 1966 Section 17(1)	Customary Land		147.1100	-5.3300	147.116666666670000	-5.333333333333300	Gazette Located	15,724.00	21-Jul-77	G61	4-Aug-77
45	Sawataitai Wildlife Management Area	Milne Bay	TERRESTRIAL	Fauna (Protection and Control) Act 1966 Section 21A & 21B	Customary Land		151.0300	-9.9600	151.033333333330000	-9.950000000000000	Gazette Located	700.00	16-Jun-77	G54	30-Jun-77
46	Sinub Island Marine WMA	Madang	MARINE	Fauna (Protection and Control) Act 1966 (Chapter 154) Section 15 & 16	Customary Land							11.80		G17	26-Jan-06
47	Siwi-Utame Wildlife Management Area	Southern Highlands	TERRESTRIAL	Fauna (Protection and Control) Act 1966 Section 21A & 21B	Customary Land		143.8700	-6.2700	144.133333333330000	-5.833333333333300	Gazette Located	12,540.00	13-Jan-77	G07	27-Jan-77
48	Sulamesi Wildlife Management Area	Sothern Highlands										86,451.00			7-Feb-08
49	Tab Island Marine WMA	Madang	MARINE									984.30			26-Jan-06
50	Tabad Island Marine WMA	Madang	MARINE									16.20			26-Jan-06
51	Talele Islands Natural Reserve	East New Britain	MARINE / TERRESTRIAL		State Land		151.5800	-4.1600	151.583333333330000	-4.166666666666700	No gazette Located	12.00	Check gazette proper		26 Nov 73 G111
52	Tavalo Wildlife Management Area	West New Britain	MARINE / TERRESTRIAL	Fauna (Protection and Control) Act 1966 Section 21A & 21B	Customary Land						Gazette Located	20000	13-Jul-77	G100	13-Nov-77
53	Tonda Wildlife Management Area	Western	TERRESTRIAL	Fauna (Protection and Control) Act 1966 Section 21A & 21B	Customary Land		141.5700	-8.9500	141.383333333330000	-8.750000000000000	Gazette Located	590000	12-Jan-75	G7	6-Feb-75
54	Varirata National Park	Central	TERRESTRIAL	Lands Ordinance 1962-1967 & NP and Gardens Ordinance 1966 Section 12	State Land		147.3700	-9.4600	147.383333333330000	-9.466666666666700	Gazette Located	1,063.00	10-Dec-69	G07	18-Dec-69
55	Wewak Memorial Park	East Sepik	TERRESTRIAL	Lands Ordinance 1962-1971	State Land						Gazette Located	1.90	31-Mar-69	G23	24-Apr-69
56	Zo-oimaga Wildlife Management Area	Central	TERRESTRIAL	Fauna (Protection & Control) Act 1966 Section 21A & 21B	Customary Land		147.1100	-9.2500	147.116666666670000	-9.250000000000000	Gazette Located	1,510.00	17-Feb-81	G18	15-Mar-81
57	Yus Conservation Area	Morobe	TERRESTRIAL	Conservation Areas Act 1978 Section 17	Customary Land						Gazette Located	75000	9-Jan-09	G5	9-Jan-09

Source: DEC

4.3.3 Toward Establishment of a National Protected Areas System

To stimulate a discussion on the issue of protected areas in PNG and the development of a strategy to devise a National Protected Area System (NPAS), DEC recently drafted a discussion paper on protected area policy (DEC 2011). The question in discussion is how they should deliver NPAS so it contributes to poverty reduction and environment protection, whilst protecting the rights of landowners who are interested in their customary land becoming part of the protected area system. The paper provides an overview of the current status of the protected area system, discusses in critical terms the current approaches to protected area priority setting, selection, establishment and management and lays the groundwork for the development of a National Policy on Protected Areas.

The main conclusions drawn in the paper are: -

- The current protected area system is small, fragmented, and is highly unlikely to be adequate in providing protection to PNG's extraordinarily high biodiversity;
- The lack of a protected area policy framework and effective legal framework is a major impediment to developing the NPAS;
- Whole-of-government land-use planning processes are required to ensure coordinated decision making regarding allocation of land and marine areas to resource development or conservation purposes;
- The protected area system will be developed primarily on customary land tenure whether on land, marine or freshwater and the long term support of local communities will be critical to the success of the initiative to create the NPAS;
- The nature of customary land tenure means landowners will continue to live in and utilize the natural resources within the protected area and this fact needs to be enshrined in the legislation underpinning the creation of protected areas;
- A system of sustainable and guaranteed financing for the communities living within protected areas is needed to ensure communities that their commitment to biodiversity will not result in them becoming trapped in poverty; and
- The NPAS will be managed by landowners and considerable effort and funding support will be needed to ensure landowner communities can meet the obligations that flow from having a protected area gazetted over their land.

It is also stated in the Discussion Paper that to date in fact, conservation and the establishment of protected areas in PNG have been driven almost entirely by NGOs. In addition, the Study Team also confirmed that designation of World Heritages sites and Ramsar wetlands have also been driven by NGOs. While NGO-driven conservation agenda recently increased number of protected areas, the Discussion Paper argues that the agenda "have generally not been effective and have resulted in the current highly fragmented and poorly resourced protected area system which does not effectively deliver on PNG's obligations for biodiversity conservation whilst causing, at times, significant conflicts with industry."

On the other hand, they admit in the Paper that the NGOs have taken the initiative on establishing protected areas partly because of the lack of Government support and action in this area. The NGOs have been frustrated with slow Government implementation of commitments made under CBD which has led many international conservation NGOs pursuing a range of alternative governance approaches, either working directly with communities to develop WMAs (i.e. WWF and WCS), or bypassing the national level by attempting to have Local Level Governments or Provincial authorities establish protected areas (i.e. TNC and CI). Such actions

can lead to the perception that foreign NGOs are attempting to set up a parallel governance system for conservation. It states "Clearly, this is not conducive to developing a nationally supported conservation agenda…One of the major concerns stemming from NGO-driven conservation is that the conservation decisions are being made unilaterally. In some cases NGO projects follow opportunistic funding and it is doubtful that the areas targeted would meet national protected areas' criteria, in terms of national significance." As examples, following gazettal, most NGOs are unable to support the protected areas with on-going financing or capacity development, or even if funding is available, due to the isolation, poor communications and conflicted community objectives in the absence of clear management objectives. In the worst cases, the gazettal of protected areas has later been contested, competing with other a proposal for logging and mining on areas overlapping with the protected areas.

Thus, DEC concludes in the paper that "…in the long term a national system of sustainable protected areas will not be achieved without ownership of the system at a national level." This is another background that they are trying to establish "National" Protected Area System (NPAS).

4.3.4 Status of Some Protected Areas (Based on the Field Observation)

(1) Mt. Wilhelm National Park

The Study Team had a field visit to Mt. Wilhelm National Park from 14th to 16th April, 2013. Mt. Wilhelm National Park is a national park located in Simbu Province gazetted in 1990 under National Park Act. The park is 817ha and includes the highest mountain in PNG, Mt. Wilhelm (4,509 m) and its surrounding area. The park itself is a state land, which is surrounded by customary land covered by forest with conservation values (Figure 4-2).

Though DEC is legally in charge of management of national parks, they haven't prepared a management plan for the national park, and they stopped posing a ranger to the park. At present there is virtually no management activity by the government.

On the other hand, the local community privately developed tourism activities conserving the nature and maintaining tourism infrastructure by themselves. There are two private lodges in Kegsugl village on the foothill of Mt. Wilhelm (outside of the park) operated by local tour operators who are also landowners. They organize tours to climb Mt. Wilhelm with international tour agents based in Port Moresby. The tour operators and other local community members using trails to Mt. Wilhelm maintain the trails themselves and personally bear the cost (Figure 4-3). The local tour operators are aware of the unsustainable resource use of some community members, then they need control of such activity by the government. In 2010, the tour operators organised training of 20 villagers on tourism with some assistance from Tourism Promotion Authority (TPA) provided.

Source: World Database on Protected Areas (WDPA)[7]

Figure 4-2 Location of Mt. Wilhelm National Park

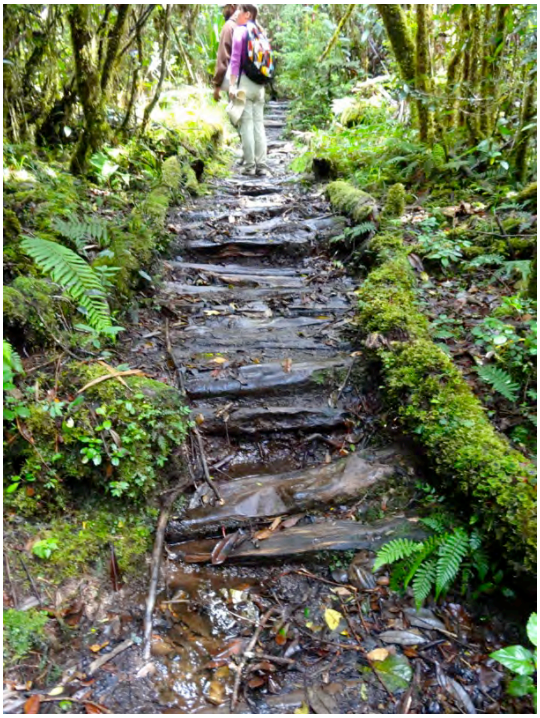


Figure 4-3 Trail to Mt. Wilhelm Maintained by Local Community

4.3.5 Varirata National Park

The Study Team had a field visit to Varirata National Park on 17th April, 2013. Varirata National Park was gazetted in 1969, even before the independence of PNG. It is considered as the oldest national park in PNG (DEC 2013). Its whole (1,063ha) is located in Central Province and it is in proximity (about 40minutes in the car) of the national capital, Port Moresby (Figure 4-5). The National Park has a humid climate. The landscape is mostly covered with closed to open

[7] http://www.protectedplanet.net/sites/Mt_Wilhelm_National_Reserve_National_Park

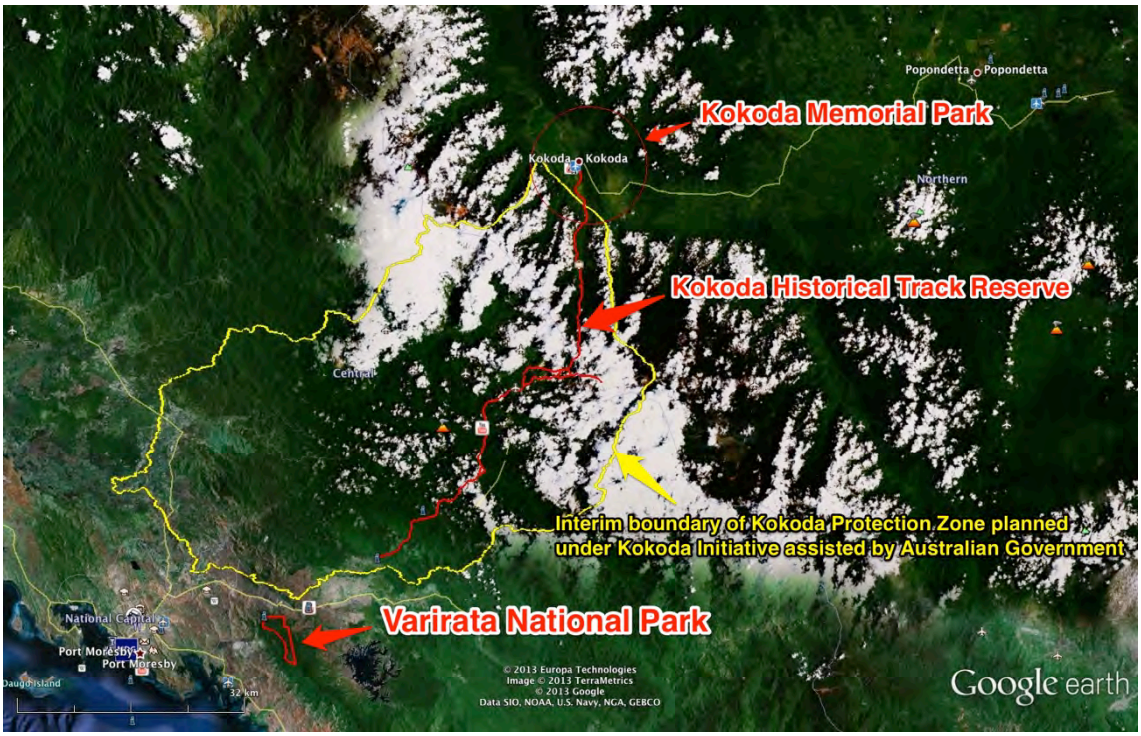
broadleaved evergreen or semi-deciduous forest. The climate is classified as tropical monsoon (short dry season, monsoon rains other months).

The park area nearby the entrance which used to be a garden and/or an area logged for sawmilling is open secondary forest. The untouched forest in the middle of the park shows characteristics of forest in tropical monsoon. According to WWF, the tropical monsoon forest in the National Park has less species diversity in comparison with the lowland tropical rainforest. However, the ecosystem is still valuable as it is unique as a representative of the area. Along the trail, there is a chance to observe bird of paradise (*Paradisaea apoda*), cockatoo (*Cacatua sp.*), Brush-turkey, etc.

Currently, approximately 20 visitors per week enter the national park paying an entrance fee (K2/p for PNG national, K5/p for expatriate). There is one ranger posted by DEC in the national park who has been working there for 30 years. There used to be 8 rangers. Some of recreational facilities (huts, shelters, roads, camping sites) were damaged or worn out. Community tourism similar to that in Mt. Wilhelm National Park was not observed in Varirata National Park.

There is no management plan for National Park, while some government agencies are now discussing its management, especially that for tourism development. DEC is conducting initial scoping in tourism development, which includes tourism development of the Park together with some other attractions around it, highlighting the risk of having tourism development of the National Park alone (DEC 2012). Tourism Promotion Authority (TPA) is also currently working on tourism infrastructure in the National Park together with DEC. NCD is also keen about the park budgeting for BBQ and Picnic ground, though the whole National Park is within the central province.

Figure 4-4 A View from Varirata National Park



Source: Google earth and Geographical data from WDPA and AusAID

Figure 4-5 Locations of Varirata National Park, Kokoda Historical Track Reserve, etc.

4.3.6 Kokoda Track

The Study Team also visited Ower's Corner, the southern entrance of Kokoda Historical (Track) Reserve on 17th April, 2013. Though it is located near Varirata National Park, as it would have more precipitation, the undisturbed forest on the Track was thicker and taller than that in Varirata National Park. One ranger was assigned by DEC at Ower's Corner for management of the Track.

Status of legal protection of the track is in question. According to the information from DEC (Table 4-3), Kokoda Historical (Track) Reserve and Kokoda Memorial Park are listed as protected areas in PNG. WWF (2009) also recognized these two sites as legally protected areas. However, gazette of these protected areas are not located by the officer in charge and date of their gazettal is not known. Locations of the two sites are recognized by DEC and the Australian government as shown in Figure 4-5. According to UNESCO[8], The current Kokoda Track Reserve protects an area only 10 meters wide on either side of the track and Kokoda Memorial Park is now proposed, that will protect the historic, cultural and natural values of the region in much larger reserve.

As stated in Section 5.3.2, "Kokoda Track and Owen Stanley Ranges" is one of the seven sites on the PNG's tentative list of world heritage sites. The site is a mixed cultural and natural site potentially including the Kokoda Track, Managalas Plateau and Mount Victoria and Mount Albert Edward region[9].

[8] http://whc.unesco.org/en/tentativelists/5061/
[9] ibid.

As stated in Section 6.3, currently "Kokoda Initiative" is implemented by DEC with technical assistance from Australian government. Under the Initiative, the Kokoda Track Authority was established in 2005.

Figure 4-6 Ower's Corner, Southern Entrance of Kokoda Track

4.4 Biodiversity Information Management

It is important to note that there are large gaps in the scientific knowledge of biodiversity in PNG. Enormous areas of the country have yet to be systematically surveyed and there is a growing need for a national biological survey to assist in assessing and managing PNG's great biological wealth.

There has been very little study on biodiversity of in particular aquatic species compared to terrestrial species. The marine biology department of UPNG has a central role in collecting marine biodiversity information. However, capacity for biodiversity research and monitoring appears to be very limited in PNG. With the exception of reefs in Kimbe Bay and Madang Lagoon, there have been virtually no long-term monitoring studies. There is a need for capacity development of coral reef conservation in PNG through training in basic reef monitoring skills such as key species identification and simple monitoring protocols such as Reef Check.

Not only academic institutions, national and international NGOs also play significant roles in biodiversity research in PNG. Major NGOs such as TNC, WCS, WWF, and CI have carried out biodiversity assessment by bringing foreign researchers from Australia, New Zealand, and other countries. For example, TNC worked in Kimbe Bay with the local communities and NGOs to facilitate marine conservation and conducted two Rapid Ecological Assessments (REAs) in 1994 and 2002, which have confirmed that the Bay has high biodiversity with more than 800 species of fish and 400 species of hard corals. REAs have also demonstrated that Kimbe Bay is an area of high importance for cetaceans (whales and dolphins). National NGOs such as CLMA also supports coastal communities to do some marine resource assessment for the management of their own reefs.

As stated above in Section 4.2, National Biodiversity Strategy and Action Plan (NBSAP, Government of PNG, 2007) sets the nine broad programs, and the fifth of them is "Research and

Information on Biodiversity." Among the various activities planned under the program, the Study Team found some activities with particular importance in its scope such as: -

- Develop a meta-database of biodiversity information sources (internal & external)
- Define and establish a national clearinghouse mechanism as a distributed network
- Develop standardized formats and establish guidelines on the responsibilities of storing, accessing, sharing and utilization of biodiversity information among local institutions involved in biodiversity issues
- Appoint a national centre (or several centres) to coordinate biodiversity identification, survey and monitoring activities
- Review the research and development programs of PINBio and strengthen the programs
- Strengthen existing collaborative biodiversity research between local institutions, and local and international institutions and organizations (cross-reference to MOUs/MOAs)

It was planned in NBSAP to achieve the goals through the programs over the five (5) years (2008-2013) and beyond. However, also in the field of research and information, there has been little progress observed in implementation of NBSAP.

Concerning the meta-database of biodiversity information, according to the country report to CBD (Government of PNG, 2010), PNG is yet to develop a species or ecosystem database to determine conservation status and trends of species and ecosystems. The Study Team also found that existing databases on diversity are fragmented in various research institutions. Furthermore, important information on biodiversity in PNG, including type and other specimens, libraries, other various databases, researchers, etc., is located in universities and other research institutes outside of PNG.

In this condition, centralization of these various databases located in and out of PNG into a centre located in PNG is not a very feasible or efficient option for biodiversity information management. Thus the development of a "meta"-database planned under NBSAP must be reasonable, which probably is a "database of databases" capturing "data about the containers of data" (meta-data), such as location and access of the database and the types of data it keeps, etc. rather than the data itself[10]. The meta-database can be utilized by a national focal point for Clearing-House Mechanism. However, the Study Team didn't observe further development of a species or ecosystem database or the meta-database from the status detailed in the country report in 2010.

Concerning establishment of a national clearinghouse mechanism, it should be noted that there is no indication of National Focal Point in PNG to the Clearing-House Mechanism (CHM) under CBD[11]. During the field study in PNG, the Study Team couldn't either identify a National Focal Point to CHM under CBD.

Concerning the strengthening existing collaborative research between local institutions, and local and international institutions and organizations, some of the local research institutes in Section 7.2 below have collaborative researches with research institutions in Australia, USA, UK, etc. However, the Study Team didn't observe an on-going research project in PNG on biodiversity being assisted by any Japanese research institutions.

[10] Many recent cases of successful inter-organisational information sharing for biodiversity conservation applied decentralized structures assuring ownership of each organization on their information. The decentralized information system seems more appropriate to network many stakeholders and databases than the centralized system. The decentralized structure of databases can be consistent with the Clearing-House Mechanism at the levels of metadata (Iguchi, 2004).

[11] http://www.cbd.int/doc/lists/nfp-chm.pdf
https://www.cbd.int/chm/network/

Target 19 of Aichi Biodiversity Targets is "By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied." For contribution to this target, Government of PNG is far behind. Reconstruction of enabling environment for biodiversity information management, such as a national Clearing House Mechanism is needed.

4.5 Legislation and Policies for Forest Industry

4.5.1 Forestry Act, 1991

The Forestry Act was enacted in 1991. It was adopted amidst very difficult circumstances, specifically, the Barnett Commission of Inquiry, which exposed rampant corruption in the industry[12], and the pressure from the World Bank. The legislation was meant to give legal mandate to the Forestry Policy of 1990. The PNGFA was established in 1993 under the Forestry Act, replacing the former Department of Forest, and unifying all Provincial Forest Divisions and the Forest Industries Council.

The Forestry Act, 1991 allows for the purchase of trees separate from the land. Under this Act, landowning groups are required to be incorporated (under the Land Groups Incorporation Act) in areas where logging companies have gained logging rights. A Forest Management Agreement (FMA) gives ownership of trees to the National Forest Service (NFS) of the PNGFA, which then directly negotiates with the logging companies. Rights are acquired for a period of 50 years, and the concession holder can operate within the timber concession for 40 years. The NFS is then also responsible for paying royalties and compensation to the Incorporated Landowners Groups (ILGs). In many cases, royalty payments were received by company representatives but never fully paid to the appropriate landowners (Winrock International, 2011).

Most logging and agriculture development projects are taking place within FMAs, and the process of signing FMAs has been heavily criticized for its lack of transparency and outright corruption. The current standards for obtaining consent would not fulfil international standards for free prior and informed consent. They fail to account for traditional land boundaries or existing disputes. FMAs can only be established by the consensus agreement of the ILG, although the incorporation process does not require the mapping of boundaries. Relatedly, FMAs were designed for logging concessions and royalty payments – not benefit sharing mechanisms and MRV (Winrock International, 2011).

Currently, operators of logging in PNG are dominated by Malaysian companies. Rimbunan Hijau, a Malaysian multinational logging corporation originated in Sarawak state, Malaysia and controlled by Malaysian (ethnic Chinese) businessman. It has become the largest timber operator in PNG directly controlling around 40% of all log exports and much of the exports of

[12] The Commission of Inquiry revealed (Anon., 1990):
- An imbalance of power between the Minister of Forests and the Department of Forests, that effectively gave the Minister of Forests total power over the allocation of concessions and licenses.
- An imbalance of power between the national Department of Forests and the provincial Divisions of Forests. The central structure held a right of veto and the right to force through projects against the wishes of local authorities.
- A high level of corruption amongst parliamentary ministers and, to a lesser degree, amongst the heads of the Department of Forests, the Forest Industries Council and the provincial governments.

The report called for:
- A slow down in timber harvesting.
- There formulation of national forest policy.
- The establishment of a nationally integrated forest service.
- The development of consultation procedures in the allocation of permits.
- The formalization of detailed requirements for sustained-yield forestry.

timber processed into lumber and veneer. Together with affiliated companies, Rimbunan Hijau controls close to 50% of PNG's log exports. In total, Malaysian companies control more than 80% of all log exports from PNG (Greenpeace, 2006).

4.5.2 Forest Policies

In 1990, following the Barnett Commission of Inquiry several new forest policies and pieces of legislation were introduced in PNG, including:

- **National Forest Policy, 1991:** Covers areas of forest management, forest industry, forest research, forest training and education, and forest organization and administration.
- **Forest Regulation No. 15 (1992):** Specifies the procedure to enable registration of forest industry participants and consultants under the Act.
- **National Forest Development Guidelines (1993):** Issued by the Minister for Forests and endorsed by the NEC, establishing an implementation guide for aspects covered in the Forest Act, especially related to sustainable production, domestic processing, forest revenue, training and education, review of existing projects, forest resource acquisition and allocation, and sustainable development.
- **Logging Code of Practice, 1996**: Became mandatory in 1997. This Code sets the standards and practices to ensure that construction of forest roads and logging is undertaken in a sustainable way.
- **1996 Forestry Regulations:** Covers all aspects of the industry procedures and control, and provide legal status for the implementation of many of the requirements specified under the Forestry Act 1991 (as amended).

4.5.3 Forest Certificate

PNG's Forest Steward Council (FSC) National Initiative was officially started in October 1996, with the establishment of the PNG FSC National Working Group. This National Working Group has been the body overseeing the development of the National Standards. The FSC National Forest Management Standards for PNG are an adaptation of the FSC Principles and Criteria in relation to the specific conditions in PNG. These National Standards have been developed by the PNG FSC National Standards Working Group through a broad participatory and consultative process. The final version of the standards was endorsed in 2008. The Standards will continue to be reviewed, revised and amended in the future. The regular reviews by the PNG FSC National Standards Working Group will take place at least once every two years (FSC 2010). Areas in total managed and certified to FSC standards in PNG is 32,610ha as of April 2012 (FSC 2012).

4.6 Legislation and Policies for Fisheries

Fishery is regulated by Fisheries Management Act of 1998 in PNG. This Act applies only to commercial fishing, not to fishing for personal consumption, sport fishing, customary or artisanal fishing.

The Act states that purpose of fishery management are to:

(a) promote the objective of optimum utilization and long term sustainable development of living resources and the need to utilize living resources to achieve economic growth, human resource development and employment creation and a sound ecological balance;
(b) conserve the living resources for both present and future generations;
(c) ensure management measures are based on the best scientific evidence available, and are designed to maintain or restore stocks at levels capable of producing maximum sustainable yield, as qualified by relevant environmental and economic factors including fishing

patterns, the interdependence of stocks and generally recommended international minimum standards;
(d) apply a precautionary approach to the management and development of aquatic living resources;
(e) protect the ecosystem as a whole, including species which are not targeted for exploitation, and the general marine and aquatic environment;
(f) preserve biodiversity;
(g) minimize pollution;
(h) implement any relevant obligations of Papua New Guinea under applicable rules of international law and international agreements.

As shown the item (f) above, preservation of biodiversity is well taken into account in the fishery management policy of PNG.

Also, according to this Act, the rights of the customary owners of fisheries resources and fishing rights are fully recognized and respected in all transactions affecting the resource or the area in which the right operates.

National Fisheries Authority is established under this law as an organization responsible for the management and development of the fisheries sector in PNG. The important functions of NFA include research and assessment of fish stocks, collecting data on aquatic resources, and development and implementation of fishery management plans. Currently the management plans are made for important commercial species such as tuna, lobster, and sea cucumbers.

4.7 Policies on Tourism

The PNG Tourism Promotion Authority (PNGTPA) was established under the Tourism Promotion Act of 1993 in order to "foster the development of tourism in PNG so as to maximize the economic benefits of the industry in PNG whilst minimizing the disruption to society and culture". The government prepared National Tourism Policy and Tourism Master Plan (2007-2017) through PNGTPA. In order to develop tourism in sustainable way, both the policy and the master plan emphasize the importance of environmental conservation.

TPA seems to be very active in promoting tourism by addressing a wide range of issues. Marketing Division mainly deals with international and domestic market promotions and awareness. On the other hand, Policy & Planning Division develops tourism policies and strategies, and provides supports for the supply-side of tourism such as investment, training and information.

One of the activities that relate to biodiversity conservations is their efforts to promote and enhance community-based tourism. They have worked extensively with many communities throughout the country supporting tourism product development. For this purpose, TPA produced a series of booklets explaining how to develop and operate guesthouses, how to develop tour guiding skills, how to market the tourism products, etc. The contents of these booklets are very detailed, practical, user-friendly, and written in very simple English. They can provide training sessions for local communities upon requests. Also, the Authority has recently assessed the condition of Varirata National Park for a possible restoration plan of the park.

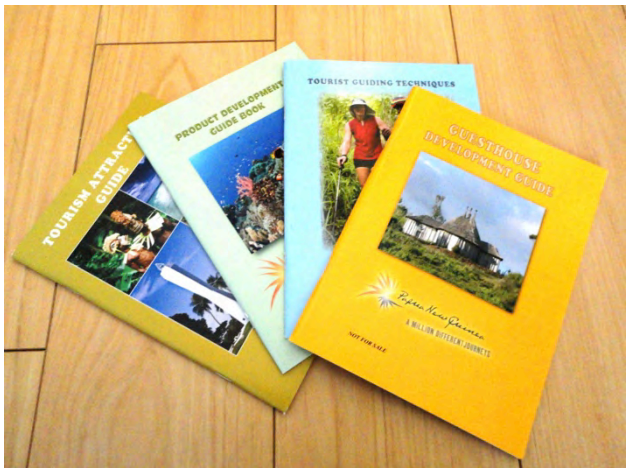


Figure 4-7 Information Booklets on Community Tourism Promotion

According to PNGTPA, some provinces have their own tourism bureaus, such as Milne Bay, Madang, New Ireland and East New Britain.

4.8 Poverty Alleviation and Biodiversity Conservation

The Government has committed to the United Nations Millennium Development Goals, one of which is Goal 7: Environmental Sustainability. Goal 7 aims to:

- Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources;
- Reduce biodiversity loss, achieving, by 2010:
  - Proportion of land area covered by forest
  - CO2 emissions, total, per capita and per $1 GDP (PPP)
  - Consumption of ozone-depleting substances
  - Proportion of fish stocks within safe biological limits
  - Proportion of total water resources used
  - Proportion of terrestrial and marine areas protected
  - Proportion of species threatened with extinction

Domestically PNG has committed to the Vision 2050 policy which includes an explicit commitment to environmental sustainability and the challenges associated with managing climate change.

Chapter 5 Response to the International Initiatives

5.1 International Biodiversity Laws and PNG

PIMBio (2004) found several treaties and strategies on biodiversity conservation at the international level have been adopted at the international level to deal with certain components of biodiversity (Table 5-1).

Table 5-1 PNG's Status in the Conventions on Biodiversity

Name of Convention	In force	PNG Signatory	Ratification by PNG	Domestic Legislation	Domestic Policy & Implementing Body
Convention on Biological Diversity (CBD)	Yes (1992)	92/6/13	93/3/16	Legislation in various sectors	NBSAP/PINBio/ DEC
Nagoya Protocol	Not yet	No	No	See Section 5.2	
Convention on the International Trade in Endangered Species (CITES)	Yes	12/12/75	11/3/75	CITES Act 2003	PINBio/DEC/ NAQIA
World Heritage Convention	Yes (1975)		Yes (1997)	National Parks Act, Conservation Areas Act	National Cultural Commission/ DEC/PINBio
Convention on Wetlands of International Importance Especially as Waterfowl Habitats (RAMSAR Convention)	Yes (1975)		Yes (1993)	Conservation Areas Act	PINBio/DEC
Agreement on Trade-Related Intellectual Property Rights (TRIPs Agreement)	Yes (1995)	Yes	Yes (1995)	No	PINBio/IPA/ MSRC
International Convention of the Union for the Protection of New Varieties of Plant (UPOV)	Yes (1991)	No	No		PINBio/NARI
International Treaty on Plant Genetic Resources for Food and Agriculture (PGRFA Treaty)	Yes (2004)	No	No	No	PINBio/NARI

Source: PINBio (2004), CBD Secretariat[13]

5.2 Nagoya Protocol

On 29 October 2010 in Nagoya, Japan, The *Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity* (Nagoya Protocol) was adopted by the Conference of the Parties to the Convention on Biological Diversity at its tenth meeting. The Nagoya Protocol is an international agreement which aims at sharing the benefits arising from the utilization of genetic resources in a fair and equitable way, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and technologies, and by appropriate funding, thereby contributing to the conservation of biological diversity and the sustainable use of its components. The Nagoya Protocol will come into force 90 days after the date of deposit of the fiftieth instrument of ratification.

The government of PNG has not signed or ratified the Nagoya Protocol yet, while 92 signatures and 16 ratifications are acquired as of 8 May 2013.

[13] http://www.cbd.int

Government of PNG has started discussion on establishment of Biodiversity Information Management and ABS. According to the review of the status of ABS in PNG by Kwa, et al (2006), ABS is a complicated issue in PNG due to the fact that these biological resources are owned by traditional customary owners and not the State as is the case of other countries. They conducted review of ABS in PNG and found that: -

- there is no single national, provincial or local policy on ABS.
- there is no existing law on ABS.
- no attempts have been made by the government previously to deal comprehensively with ABS.

The review provided an in-depth analysis of the socio-cultural aspects of ABS; international aspects of ABS; the relevant policy and legal framework associated with ABS in PNG; research and development and ABS; and intellectual property rights' aspects of ABS, then recommended that:

- a national ABS Policy be developed immediately; and
- an ABS Bill be formulated and enacted soon.

During the interview by the study team, UPNG considers ABS as a critical task for them as it affects their research activities with foreign partners. They also informed that for legislation for national ABS regime in PNG, they are working closely with the Australian government and the German government. On the other hand, during the interview survey to the other government agencies which may concern with ABS issues, there was little indication of their awareness of importance of ABS and necessity of national ABS regime.

Target 16 of Aichi Biodiversity Targets is "By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation." To contribute to the target, in PNG, assistance is required to facilitate their signing and ratification of Nagoya Protocol and to establish a domestic ABS mechanism starting from awareness raising of the policy makers and officers about meaning and necessity of ABS.

5.3 Inscription of World Heritage Sites, Ramsar Wetlands, etc.

5.3.1 Ramsar Wetlands

The Convention on Wetlands of International Importance (Ramsar Convention) came into force for PNG in 1993. PNG presently has 2 sites designated as Wetlands of International Importance (Ramsar Wetlands), with a surface area of 594,924 hectares.

Lake Kutubu: Lake Kutubu Wildlife Management Area located on 06º25'S 143º20'E with area of 4,924 ha was designated as Ramsar Wetland in 1998. Lake Kutubu, the second largest lake in PNG is a freshwater lake in limestone karst country in PNG's remote and isolated Southern Highlands at 800m above sea level, the site includes approximately 1,000 hectares of swamp forest. The lake's extraordinary level of endemicity (10 of the 14 fish species found there are endemic to the lake itself) exceeds that of any other lake in the entire New Guinea-Australian region. The development of oil and gas in the region has increased access with the development of road links and regular flights. The villages around the lake rely principally upon sago subsistence agriculture.

Tonda Wildlife Management Area: Tonda Wildlife Management Area located in Western Province on 08º45'S 141º23'E with area of 590,000 ha was designated as Ramsar Wetland in

1993. The flat, coastal plains are subject to seasonal, freshwater flooding. The site, bordering Indonesia, includes tidal river reaches, mangrove areas, grassland, and savannah woodlands. It is an important wetland for over 250 species of resident and migratory waterbirds and as a refuge during drought. Most of the world population of *Numenius minutus* stage on the plains during migration. Sixty-three species of fish are supported. About 1,500 subsistence gardeners and hunters live in the area. Visitors come for fishing, bird-watching, and deer or *Lates calcarifer* hunting. The site is connected to the Wasur National Park Ramsar site in Papua province in Indonesia.

In addition, according to WWF, they assisted DEC to propose Upper Sepik River Basin as another Ramsar Wetland drafting Ramsar Information Sheet (dossier for designation of Ramsar Wetland).

5.3.2 World Heritage Site

PNG has one World Heritage site (Kuk Early Agricultural Site) inscribed in 2008 as a cultural heritage. The site contains well-preserved archaeological remains demonstrating the technological leap which transformed plant exploitation to agriculture around 6,500 years ago. The Site is a world cultural heritage inscribed for its cultural value rather than its value of biodiversity. UNESCO considers the legal protection in place as adequate, but customary protection needs confirmation as soon as possible through the designation of the property as a Conservation Area and through the associated formal land management agreement with the local community for aspects of site management[14]. It is exceptional for world heritages that the site without a proper management plan was inscribed. Currently the management plan is being prepared with assistance from Australian government.

PNG also has a national tentative list of world heritages on which there are currently seven sites such: -

- Huon Terraces - Stairway to the Past (submitted on 6/6/2006)
- Kikori River Basin / Great Papuan Plateau (submitted on 6/6/2006)
- Kokoda Track and Owen Stanley Ranges (submitted on 6/6/2006)
- Milne Bay Seascape (Pacific Jewels of Marine Biodiversity) (submitted on 6/6/2006)
- The Sublime Karsts of Papua New Guinea (submitted on 6/6/2006)
- Trans-Fly Complex (submitted on 6/6/2006)
- Upper Sepik River Basin (submitted on 6/6/2006)[15]

All the seven sites were submitted as mixed heritages and both the cultural and natural criteria of world heritage are applied. To all the seven sites in the tentative list, Criterion (x) of world heritage on biodiversity value is applied. Criterion (x) is “to contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.”

5.3.3 Site Inscribed for Other Global Significance

PNG doesn’t have a Biosphere Reserve inscribed under the Man and Biosphere Programme (MAB) described by UNESCO, Global Geopark inscribed by UNESCO or Globally Important Agricultural Heritage Systems (GIAHS) recognized by FAO.

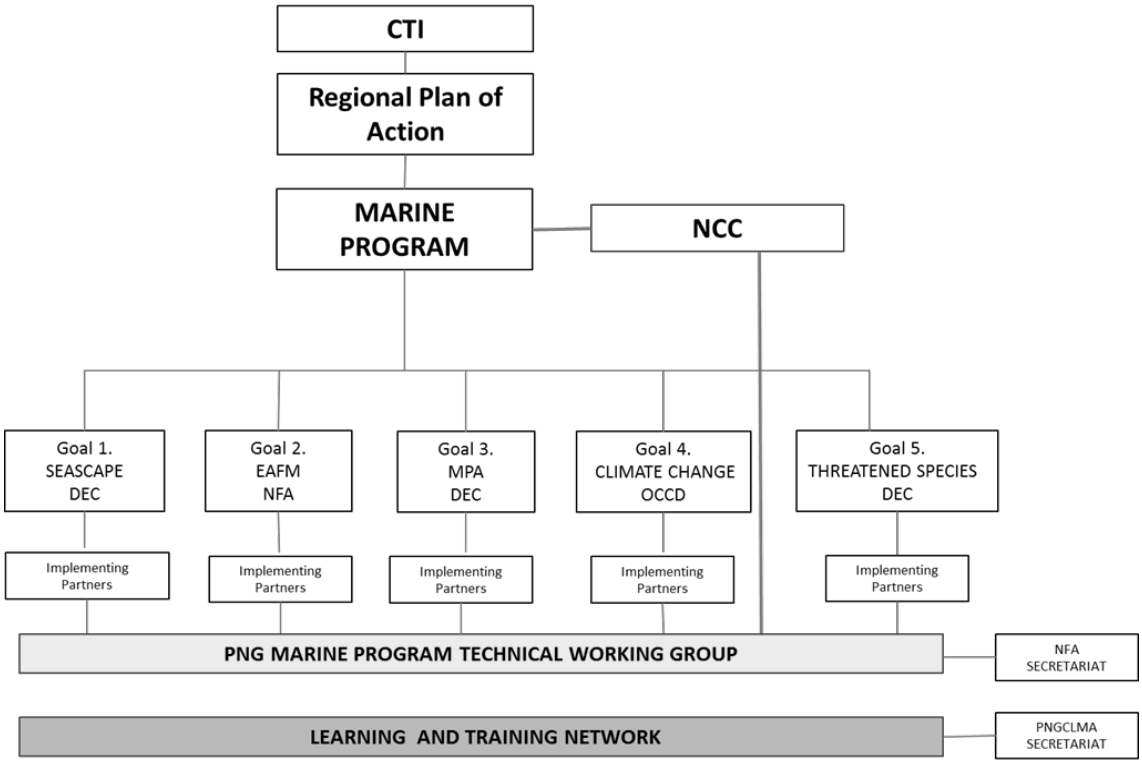
[14] http://whc.unesco.org/en/list/887
[15] http://whc.unesco.org/en/tentativelists/state=pg

5.4 Response to CTI

Coral Triangle Initiative (CTI) is a multilateral partnership for conservation of valuable coral reef ecosystem. The target area is called Coral Triangle which is known as the centre of high biodiversity and covers the ocean area of 6 countries including PNG, Malaysia, Indonesia, Timor Leste, the Philippines and the Solomon Islands. The Initiative is supported by the US, Australia with international donor agencies and NGOs.

PNG is a major participant of CTI and the National Coordination Committee (NCC) was established in May 2009 to provide intra-government coordination of PNG's involvement in the Coral Triangle Initiative. The NCC is led by representatives from the Department of Environment and Conservation, the National Fisheries Authority, and the Office of Climate Change and Development. In DEC, Marine Protected Area Division is in charge of coordinating CTI activities. Actual implementation of CTI activities are also largely supported by NGOs such as CLMA.

Under the National Plan of Action (NPOA), there are 5 goals supported by DEC, NFA, or OCCD. Figure 5-1 shows the organizational structure for implementing CTI in PNG.



Source: CLMA

Figure 5-1 Implementing Structure for CTI in PNG

Chapter 6 Projects on Biodiversity Conservation

6.1 Community-based Forest & Coastal Conservation and Resource Management (assisted by UNDP and GEF-4)

Community-based Forest & Coastal Conservation and Resource Management in PNG is the project assisted by UNDP with mobilization of the fourth replenishment of Global Environment Facility Trust Fund (GEF-4). The programme period is 2011-2018. This project proposes to deal with community conservation as a resource management issue, and thus align national conservation needs with landowner value systems.

The **overall objective** of the project will be to develop and demonstrate resource management and conservation models for landholding communities that effectively incorporate community-managed conservation areas as part of agreed national priorities with industry and government. The **key impact indicator** associated with this objective will be the extent of high conservation value area which is brought under effective community-based conservation at targeted sites.

Outcomes to achieve this will be delivered in four sequential components:

Component 1: National enabling environment for a community-based sustainable national system of protected areas containing globally and nationally significant biodiversity through improved institutional coordination, consolidated policy and legislation, improved DEC staff capacity and development of funding structures to underpin conservation planning.

Component 2: Identification and establishment of conservation areas through a structured science-based process, which aims to add 1 million hectares to the sustainable national system of PAs through the establishment of new Conservation Areas and/or conversion of viable existing WMAs into Conservation Areas which can effectively remove current and future pressure for forest degradation and conversion. This component will implement the outputs of Component 1 to establish and strengthen the network of PAs on the ground. Initially, the project will identify and establish at least two new Conservation Areas (CA), such as the Owen Stanley Ranges CA, incorporating the Kokoda Interim Protected Zone and at least one CA in New Britain, including an assessment for the proposed Nakanai World Heritage Area. Integral to this component will be the development of a National Biodiversity Information System (NBIS) comprising spatial and non-spatial information on PNGs biodiversity and socio-economics. The NBIS will enable better monitoring of conservation status to improve mapping and risk assessment of national biodiversity assets.

Component 3: Conservation Area management planning and partnership agreements with communities to ensure that CAs are effectively managed according to the agreed criteria to maintain biodiversity values and deliver the economic development outcomes through payment for environmental services schemes specified in the community partnership agreements.

Component 4: Capacity development for CA management training needs to be on-going and supported for Provincial, District and Local Level Government officials to help develop and implement tools for community management groups to deliver improved services, income, planning and education opportunities for communities within and around CAs.

The **Project sites** are 1) Owen Stanley Ranges and Kokoda, and 2) New Britain island. In Owen Stanley Ranges and Kokoda, conservation projects already have unified support and represent the best opportunity to develop a coherent all-of-government approach. The area is also important for its potential for tourism development, as water catchment of Port Moresby and its biodiversity. New Britain Island offers an opportunity to implement the national high level

planning and mapping approaches advocated in Component 1. The ecosystem of New Britain demands a reef-to-ridge conservation approach. The Nakanai Range was placed on the World Heritage Tentative list in 2006 as part of the Sublime Karsts of Papua New Guinea (Section 5.3.2).

Total allocated resources to the project is US$ 29.9 million consisting of 6.9 million from GEF Trust Fund, 5 million from Government, 2 million from UNDP, 14 million from bilateral assistance from Australia and 2 million from Bishop Museum.

Currently the project is going slowly due to the capacity constraints, and the rapidly-escalating costs in PNG. However, they are making good progress in establishing partnerships with local stakeholders particularly in New Britain Island, and they are expecting that the on-going project will provide useful lessons for the new project stated below.

6.2 A Project Assisted by UNDP and GEF-5 (in Preparation)

DEC is now proposing UNDP another project mobilizing the fifth replenishment of GEF Trust Fund (GEF-5) for supporting the national Protected Area system in PNG. According to the draft project concept prepared by DEC, it is named as “Strengthening the Management Effectiveness of the National System of Protected Areas” and its objective is “To strengthen national and local capacities to effectively manage the national system of protected areas and address threats to biodiversity and ecosystem functions in these areas.” They set two components of the project such as 1) Management capabilities of the PNG State to oversee Protected Area Management, and 2) Strengthening the capacity of the state and local communities to cooperatively manage protected area sites.

As target protected areas in the project, DEC is tentatively listing Bensbach WMA, Baiyer River Wildlife Sanctuary, Sepik Wetlands WMA, Varirata National Park, Managalas WMA, Mt. Wilhelm National Park and Yus Conservation Area.

The total financing from GEFTF being requested for this Project is US$12.24 million inclusive of project preparation grants (PPG) and Agency fees for project cycle management services associated with the total GEF grant.

A team of UNDP officers are currently developing a concept for the new project and they plan to visit PNG in June 2013 to elaborate the plan of the project.

6.3 Kokoda Initiative (Assisted by Australian Government)

The Kokoda Initiative started in the April 2008 when the governments of PNG and Australia signed a two year Joint Understanding on the Kokoda Track and Owen Stanley Ranges, although the Australian Government has been working with the PNG Government in the management of the Kokoda Track since the late 1990s. The Kokoda Initiative recognises that an area to the north east of Port Moresby (the Interim Protection Zone in Figure 6-1) encompassing water catchments and areas of the Owen Stanley Ranges demonstrates a range of cultural, natural and historical values. The Joint Understanding in 2008 focused on community access to basic services, the identification and protection of the heritage values of the region and maintenance of the Kokoda Track and the trekking experience for tourists. Following a review of the program a second Joint Understanding was signed by both governments in 2010 which expanded the focus and outcomes of activities in the region.

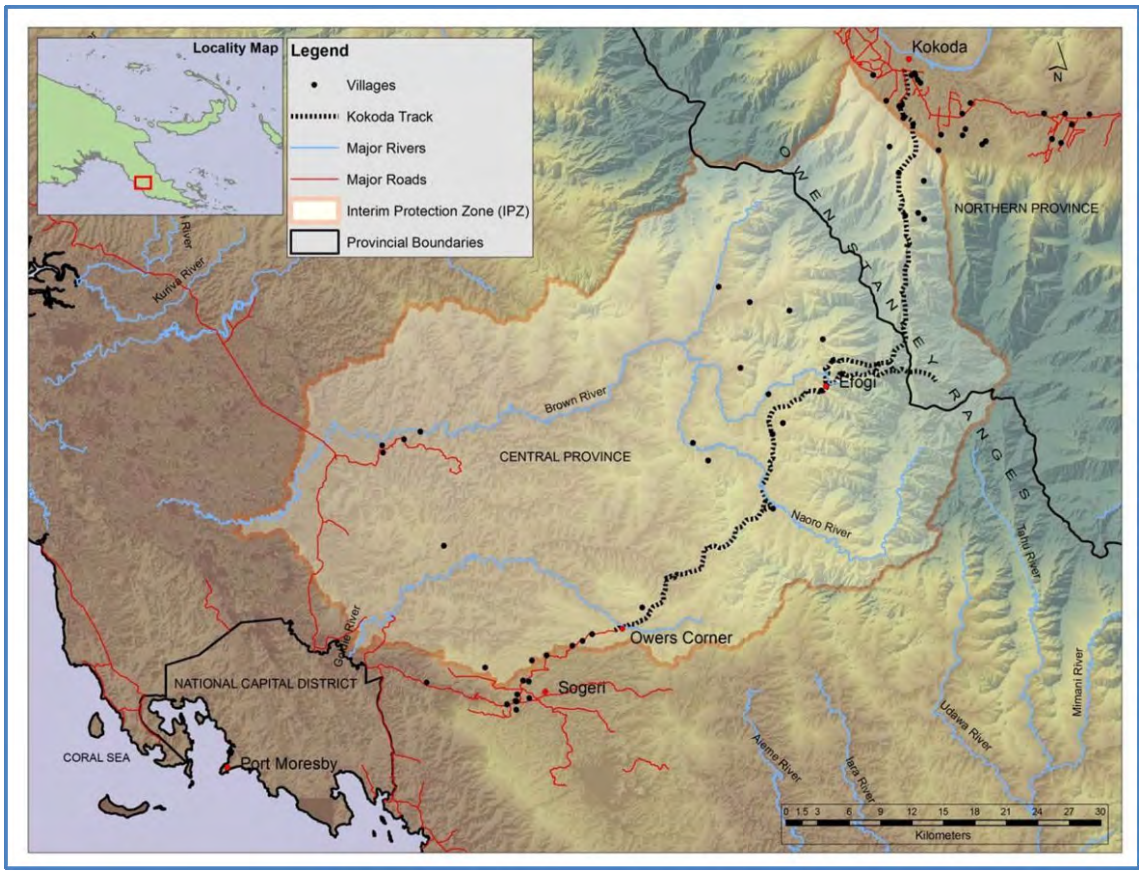


Figure 6-1 Map of Interim Protection Zone Targeted by Kokoda Initiative

According to the project design of Kokoda Initiative for the period of April 2013 to Dec. 2015 (DEC and DSEWPaC, 2012), the vision of the Kokoda Initiative is "Sustainable development of the Owen Stanley Ranges, Brown River Catchment and Kokoda Track Region and protection of its special natural, cultural and historic values." This vision is implemented through five concurrent and mutually reinforcing goals which are: -

1. A safe and well-managed Kokoda Track, which honours its wartime historical significance and protects and promotes its special values
2. Enhanced quality of life for landowners through improved delivery of basic services, income generation and community development activities
3. The wise use and conservation of the catchment protection area, including the Kokoda Track and its natural and cultural resources and values
4. Building national and international tourism potential of the Owen Stanley Ranges and Kokoda Track Region, supported by a possible future World heritage nomination
5. Working with communities, landowners, industry and all levels of government to ensure that activities established under the Kokoda Initiative are sustained into the future.

Their main counterpart agencies in Government of PNG are the Central provincial administration and the Northern provincial administration. Kokoda Initiative is mobilizing inputs from the provincial administrations and lower level of government administration. According to the expert dispatched by Australian government, now the provincial administration are very strong supporters for Kokoda Initiative but it took a few years to adopt this attitude.

The Kokoda Initiative is not only contributing to biodiversity conservation in the target area it also has a nation-wide impact. Activities under Goal 3 include finalisation of the National Protected Area System (NPAS). It is based on their recognition that the Kokoda Initiative provides an avenue for governments to respond to community needs and for communities to take greater responsibility for land management within a new national government framework of protected area policy and legislation. Furthermore, under Goal 3, rapid biodiversity survey to support natural heritage identification, mapping, land use planning, conservation management, as well as capturing of biodiversity data from international scientific collections are planned.

6.4 Mangrove Rehabilitation for Sustainably Managed Healthy Forests (MARSH) assisted by USAID, IUCN, etc.

Mangrove Rehabilitation for Sustainably Managed Healthy Forests (MARSH) project is a 5-year project that is funded by USAID (US$ 7.5 million for 5 years). Through MARSH, USAID will support the development of a mangrove rehabilitation project in PNG. The envisioned project will support USAID's strategy for the Pacific by decreasing deforestation and forest degradation and increasing the resilience of communities to the negative effects of climate change. Project duration is 5 years starting October 1st 2012. USAID anticipates that the best practices developed during years one through three will be expanded to the Solomon Islands and Vanuatu from year four.

MARSH will engage a partnership approach with IUCN taking the lead in overall project management and coordination while partners WCS, TNC and WWF will implement particular components and activities. Other local partners that will also be engaged in implementation of project activities include Office for Climate Change and Development (OCCD), University of Papua New Guinea (UPNG), PNG Centre for Locally Managed Areas (PNGCLMA), PNG Assembly for Disabled Persons (PNGADP) and Partners with Melanesians (PWM).

Key geographic areas of MARSH include:

- Manus province
- New Britain province
- New Ireland Province
- Central province and
- National Capital District

Objectives of Marsh are as follows:

- Build the capacity of PNG Universities, National and sub-national institutions, in mangrove carbon monitoring, reporting and verification.
- Strengthen the organizational capacities of civil society to support sustainable development through community-based mangrove forest management.
- Strengthen community capacity on sustainable mangrove forest management.
- Strengthen the adaptive capacity of coastal communities through community-based mangrove forest management.
- Support community rehabilitation and sustainable management of mangrove forests
- Explore sustainable finance models and mechanisms that support long-term community based mangrove forest management, including; adaptation funding and REDD+/mangrove carbon finance.

Chapter 7 Stakeholders and Their Activities Concerning Biodiversity Conservation

7.1 Agencies

7.1.1 Department of Environment and Conservation (DEC)

The Department of Environment and Conservation (DEC) was established in 1985. In the past, the Department had several regional offices and staff members throughout PNG. However, due to its limited budget and human resources, the regional offices were closed and the Department was centralized to the capital city. A large scale institutional restructuring also took place in 1990s as a result of review by World Bank. Current number of employees is around 130. The organizational chart of DEC is shown in Figure 7-1.

Source: DEC (http://www.dec.gov.pg/organisation-structure.html)

Figure 7-1 Organizational Chart of DEC

As the name indicates, DEC is the agency in charge of environmental conservation in PNG and has a range of functions such as designation and management of protected area, conservation and assessment of endangered species, and sending delegations of international conferences. Currently, some of the legislation is being revised, including Protected Area Act of 1978, and also the restructuring of the organization is being planned with the assistance of UNDP.

According to DEC, Government of PNG has been discussing restructuring of DEC into Conservation and Environmental Protection Authority (CEPA), which will have more independent financial mechanism.

7.1.2 Forest Authority (PNGFA)

PNGFA was established in 1993 under the Forestry Act, 1991. It has 386 permanent employees throughout the country that includes foresters as well as non-foresters such as economists, lawyers and accountants. The Authority also has about 300 casuals that include labourers, cleaners and drivers. Its organisation is shown in Figure 7-2. It has 18 provincial offices (in most of the provinces) in addition to the Headquarter in Port Moresby. Its mission is to "promote the management and wise utilization of the forest resources of Papua New Guinea as a renewable asset for the well-being of present and future generations."

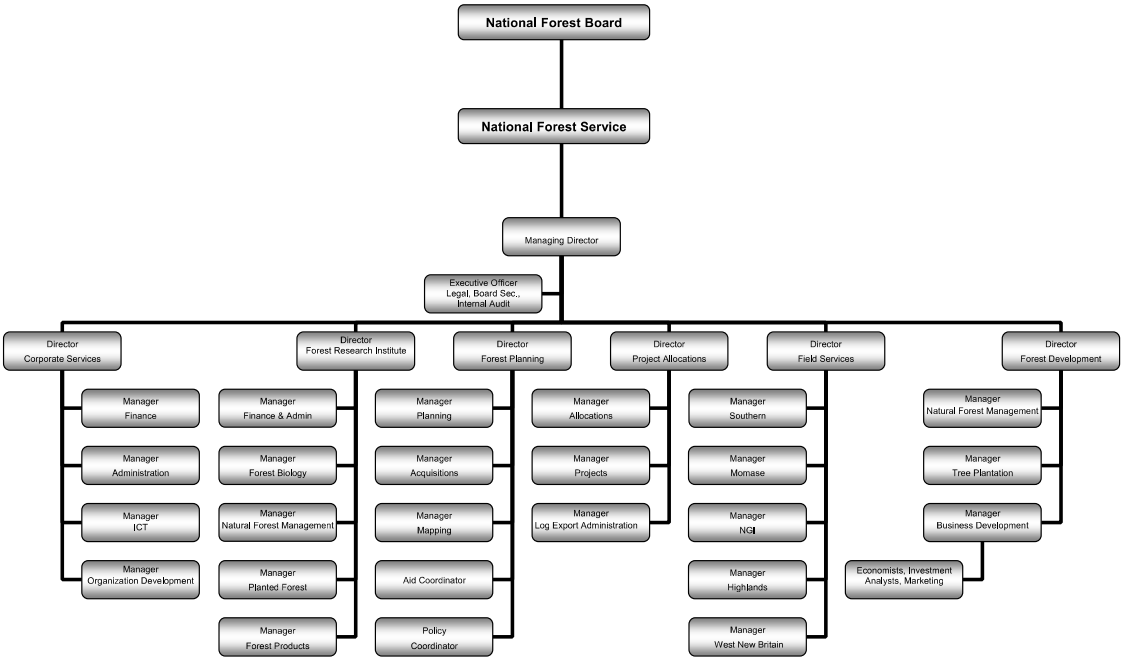


Figure 7-2 Organisation of PNGFA

The Authority undertakes the following functions, as mandated by the Forestry Act 1991:

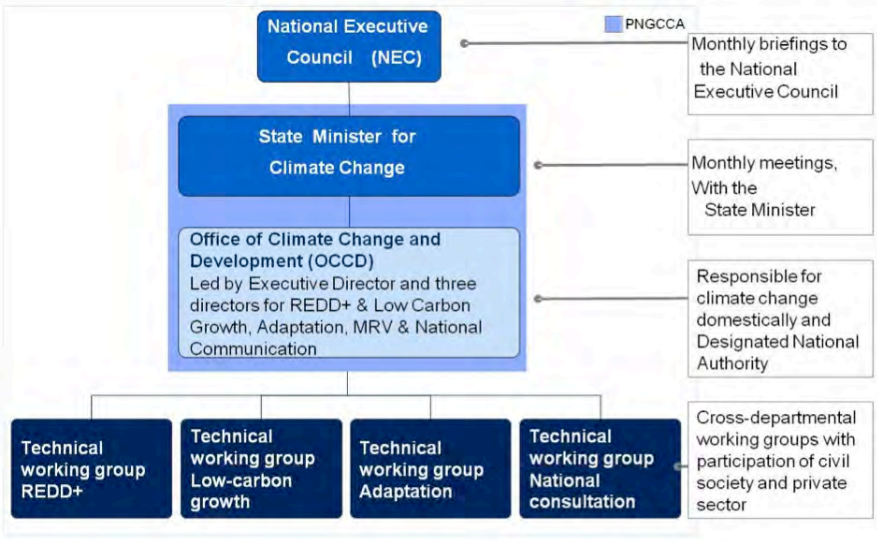
1) To provide advice to the Minister on forest policies and legislation pertaining to forestry matters;
2) To prepare and review the National Forest Plan and recommend it to the National Executive Council for approval;
3) Through the Managing Director, to direct and supervise the National Forest Service;
4) To negotiate Forest Management Agreements;
5) To select operators and negotiate conditions on which timber permits, timber authorities and licenses may be granted in accordance with the provisions of this Act;
6) To control and regulate the export of forest produce;
7) To oversee the administration and enforcement of this Act and any other legislation pertaining to forestry matters, and of such forestry policy as is approved by the National Executive Council;
8) To undertake the evaluation and registration of persons desiring to participate in any aspect of the forestry industry;
9) To act as agent for the State, as required, in relation to any international agreement relating to forestry matters;
10) To carry out such other functions necessary to achieve its objectives or given to it under this Act or any other law.

The forest type map of PNG was created in 1991 using information from aerial photos and ground survey. Biodiversity is not indicated in the map. Forest types were determined by common species mainly for the purpose of utilisation of timber; at that time it was not intended to be used for biodiversity conservation. The map was prepared based on aerial photos and topographical maps. The protected areas are not indicated on the map. The forest type map is now being updated with the cooperation of JICA funded Technical Cooperation Project for Capacity Development on Forest Resource Monitoring for Addressing Climate Change in PNG.

7.1.3 Office of Climate Change and Development (OCCD)

The Office of Climate Change and Development (OCCD) is the coordinating agency in Government of PNG for all climate change related policy and actions in the country and the designated National Authority under the United Nations Framework Convention on Climate Change (UNFCCC). The OCCD was established in September 2010 and replaces the former Office of Climate Change and Environmental Sustainability (OCCES), abolished by the Cabinet (NEC) in 2009[16].

The OCCD is a lean office with 22 staff members including 15 technical officers, headed by acting executive director. Beneath the executive office, the OCCD is comprised of three divisions, each headed by a director: REDD+ and Mitigation, Adaptation, MRV and National Communication. OCCD was once under a National Climate Change Committee headed by Chief Secretary to the Government, but the Cabinet made decision in 2012 to let OCCD under control of Minister for Forests & Climate Change (Figure 7-3).



Source: OCCD[17]

Figure 7-3 Governance Structure of OCCD

Since the conferences of parties (COPs) for UNFCCC has applied REDD+, forest conservation became a part of the climate change issues, biodiversity is one of the issues OCCD is discussing. OCCD has signed MOUs with universities and institutes for information management on biodiversity such as development of species inventories, and review of value of genetic

[16] According to OCCD, initially in Sep. 2008, Office of Climate Change and Carbon Credit was established, then a few months later, OCCES was formed. It was abolished in 2009, because of mismanagement and the government felt the office was too big. They closed the office, and in April 2010, the new OCCD was established.

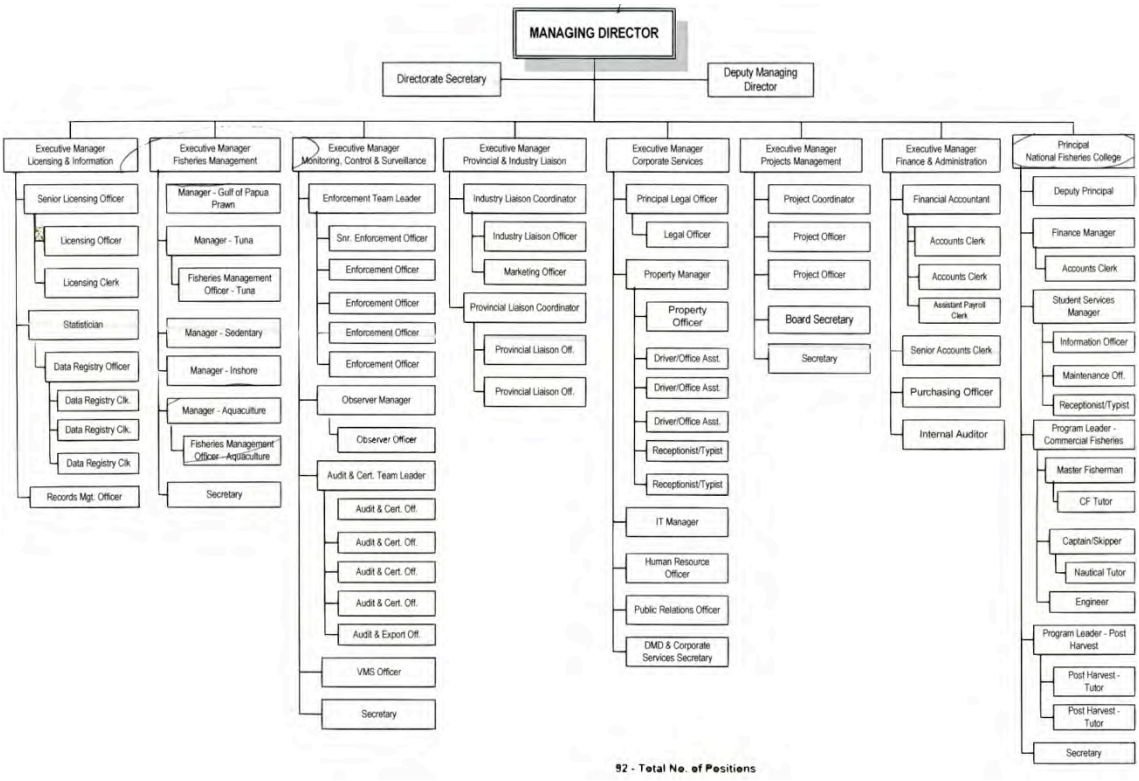
[17] http://www.occd.gov.pg/index.php?option=com_content&view=article&id=65&Itemid=83

resources. OCCD recognise that they share mandate of biodiversity conservation in PNG with DEC and PNGFA.

We are coordinating with other agencies. There are various technical working groups (WGs) for the climate change issues in PNG, including REDD+, Law carbon growth, adaptation, national communication and Measuring Reporting Verification (MRV). For REDD+, there are three sub-working groups on 1) Forestry, 2) Agriculture, and 3) Safeguards. OCCD is secretariat for all these WGs which are formed by various stakeholders.

7.1.4 National Fisheries Authority

The National Fisheries Authority (NFA) is a non-commercial statutory authority established and operating under the Fisheries Management Act 1998 and related regulations. The organisation is led by a Managing Director appointed by the Cabinet. NFA has been structured into seven business groups. All business groups are based in Port Moresby except the Institute of Sustainable Marine Resources (ISMR) which is based in Kavieng, New Ireland Province (Figure 7-4). Number of officers in NFA is approximately 120. Number of officers in the Fisheries Management Section in charge of monitoring and research is 27.



Source: NFA

Figure 7-4 Organisation of NFA

NFA does monitoring of only commercial species such as some species of tuna (tagging study, port sampling and growth and reproduction study), sharks (proposed study of population), 20 species of sea cucumber (stock assessment of sea cucumber, underwater visual census and data of habitat), prawns and lobster (annual prawn survey to see if they are coming to the fishing ground and species composition).

Under the Torres Strait Treaty with Australia[18], NFA is responsible for monitoring sizes of lobsters, prawns (commercially exploited), fish and sea cucumber which are harvested. NFA conducts survey together with the Australian government and shares the data. A project funded by GEF through CTI for by-catch of prawn fishery initially began in 2008. NFA is sill finalizing the work plan to collect data of by-catch, which is important for marine biodiversity conservation. They are using nets and by-catch can reach 80-90% of the total catch. Prawn culture is rare in PNG. There is one in Rabaul, operated by a Malaysian company.

NFA formulate various fisheries management plans under the four sub-sections under the Fisheries Management Section. They are reviewed every three years.

Management of mangrove is in jurisdiction of DEC. However, NFA has a mangrove rehabilitation programme. NFA also has a coral reef restoration programme. Protection of turtles, whales dolphins and other marine legally protected species are under DEC.

7.1.5 Tourism Promotion Authority (PNGTPA)

As stated in Section 4.7, PNGTPA is an agency in charge of promoting tourism in PNG. Its mission is to maximize the benefit by tourism promotion while minimizing the negative effects on the society and culture. The number of formal staff is 25 working in 3 divisions; Corporate Services Division, Marketing Division and Policy & Planning Division.

7.1.6 National Museum and Art Gallery

The National Museum and Art Gallery is located at Waigani in Port Moresby, neighbouring the National Parliament. The Museum was established in around 1975, soon after the independence of the country. There are 6 departments in the Museum, 1) Natural History, 2) Anthropology, 3) Conservation, 4) Administration, 5) Education and 6) Public Relations. It is under the Ministry of Tourism, Culture and Education. They have 1 archaeologist from UPNG and 1 anthropologist (the director of the museum). It maintains about 60,000 pieces if anthropological collection such as artefacts, handcrafts, paintings and sculptures.

As for natural history collection, it has 100,000 specimens of more than 10,000 species of mammals, birds, reptiles and amphibians collected from over 50 years from every part of PNG. The museum also carries out some research activities (although not as active as it was in the past), in collaboration with overseas institutions such as Smithsonian Museum in Washington DC, Bishop Museum in Hawaii, Australian Museum, and National Museum of Ethnology in Japan.

However, as there is no biologist in the museum, their collection and research on biodiversity is passive. Most of the specimens are collected during field expeditions planned by foreign institutes with their own agenda.

In 2002, Japanese Government provided Audio Visual equipment to the museum. The museum has joint research with Dr. Isao Hayashi, a social anthropologist at National Museum of Ethnology Japan. He did his research in Aitape before and after the tsunami in 1998.

In 1996, the master plan and feasibility study of Constitutional Park and Natural Heritage Centre, including renovation of the buildings for the museum, was formulated (Figure 7-5). Now, only the international convention centre in the plan is under construction, funded by Chinese government, as Phase 1 of the master plan, though the location of the centre is changed

[18] The Torres Strait Treaty was signed in December 1978 and came into force in February 1985. It defines the border between Australia and PNG and provides a framework for the management of the common border area.

from the original plan. The living museum (or a zoo) in the plan is now in land title distribute and they cannot find funding source to construct it.

Source: National Museum and Art Gallery

Figure 7-5 Master Plan of Constitution Park and National Heritage Centre

7.1.7 Department of Agriculture and Livestock

The Department of Agriculture and Livestock (DAL) mission is to increase agricultural production for domestic consumption and export, thus increasing the well-being and contribution to social economic development. Under the DAL, the Provincial and Industrial Support Services (PISS) provide quality advice and Technical support to the Provinces and Industry so as to further develop and expand Agriculture base. This branch of the DAL acts as a bridge between Research, Extension, Industry and DAL and it has land use management as one of its main functions.

DAL is not in charge of fulfilling commitment of Government of PNG for CITES, DEC is. DAL is not in charge of quarantine either, NAQIA (national agriculture quarantine and inspection authority) is.

Concerning SABL, in the past DAL was not consulted during preliminary investigation and the following process of issuance of SABLs. According to DAL, Department of Land and Physical Planning was responsible for the issuance of SABLs. The increase of uncontrolled issuance of SABLs was not caused by the initiative of DAL. However, Greenpeace (2012) considers DAL as being responsible for the problem as it failed to offer advice.

7.1.8 Central Provincial Administration

The Study Team interviewed to the Central Provincial Administration to clarify structure of local administration in PNG in particular in the Central Province, as well as the role of them and lower local administration units in protected area management, especially for Varirata National Park.

The structure of local administration in PNG is as shown in Figure 7-6. PNG has 22 province-level divisions, such as 20 provinces, one autonomous region (Bougainville) and National Capital District. A province has districts which are administered by District Administrations headed by District Administrators. A district is further divided into the areas Local Level Governments headed by LLG managers and LLG presidents. A district is divided into wards as smallest administrative unit in PNG.

The Central Province is one of the 20 provinces, and is administered by the Central Provincial Administration. Varirata National Park is located within a ward or a few wards, in Koiari Local Level Government, in Kairuru Hiri District, in the Central Province. Whenever DEC or a donor want to communicate with local communities around Varirata National Park and their representatives in lower levels of local administration, It was advised to consult with the Provincial Administration at first.

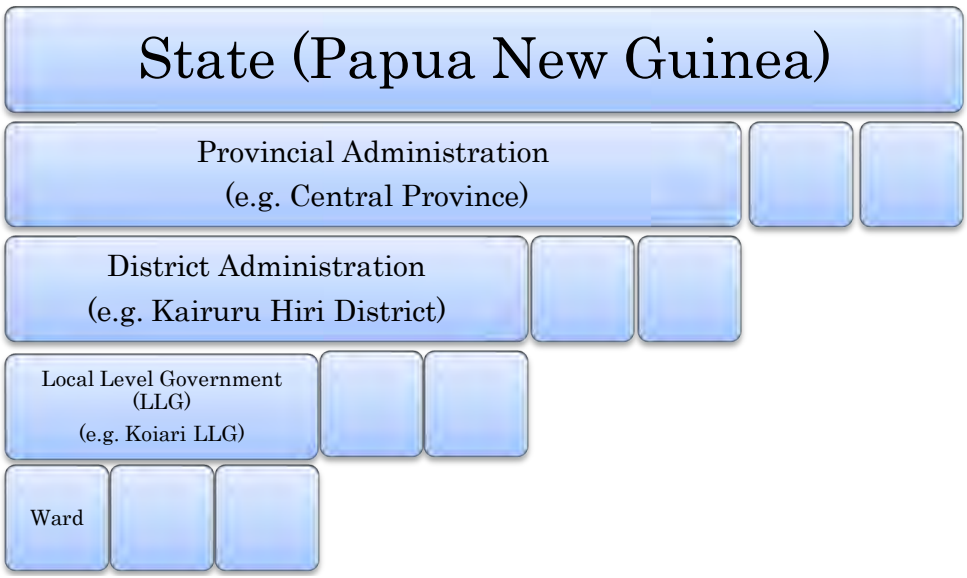


Figure 7-6 Structure of Local Administration in PNG

7.1.9 National Commission for UNESCO

Papua New Guinea National Commission for UNESCO is an agency established in 1977 by Government of PNG aiming to promote/facilitate UNESCO Programmes in PNG. They have currently 42 staff members. They are an autonomous body but obliged to report to Minister for Education.

For management and proposal of World Heritage sites, Government of PNG formed the national World Heritage committee. DEC is a secretariat for the committee and the National Commission for UNESCO is its member. As stated above in Section 5.3.2, PNG has one World Heritage site, Kuk Early Agricultural Site and currently the site management plan is being prepared with assistance from Australian government. The national World Heritage committee is primarily responsible for preparation of the site management plan. According to the National Commission for UNESCO, after completion of the site management plan of Kuk, the committee will start discussing nomination of another World Heritage site.

As the National Commission for UNESCO are responsible for promoting any programmes under UNESCO, they are also promoting MAB once it is implemented in PNG. Promotion of MAB would be under jurisdiction of the Science Progaramme Advisor in the National Commission.

7.2 Research Institutes

7.2.1 University of Papua New Guinea (UPNG)

The University of PNG (UPNG) was established by ordinance of the Australian administration in 1965, and after the independence a new act repealing the old Ordinance was passed by the National Parliament in August 1983. There are more than 15,000 students annually in Port Moresby campuses, five Open Campuses and 13 Study Centres including:

- Centre for Research and Postgraduate Studies
- Centre for Teaching, Learning and In-House Training
- Open College
- School of Business Administration
- School of Humanities and Social Sciences
- School of Law
- School of Medicine and Health Sciences
- School of Natural and Physical Sciences

UPNG has contributed to various studies and projects on biodiversity conservation in PNG. For example, UPNG Remote Sensing Unit supports many of the governmental tasks including *The State of the Forest of Papua New Guinea* (Shearman et al., 2008), and operates the country's most advanced GIS system. Preliminary estimates of carbon stocks in PNG have been conducted by the Centre by integrating field measurements of above and below ground live biomass from across PNG, a high-resolution forest map of PNG, and bioclimatic indices. For PINBio, scholars in Law School and other schools in UPNG authored reports on biodiversity law and policy (Kwa, 2004) and ABS (Kwa, et al., 2006) in PNG.

7.2.2 Papua New Guinea Institute of Biodiversity (PINBio)

Even though it is called an 'institute', the Papua New Guinea Institute of Biodiversity (PINBio) is a flexible networking platform for public and private research institutes including the NGOs. PINBio was established by the government in 1998. Its primary mission is to develop and establish a conservation-based industry in PNG through and appropriate research and development (R&D) programs. The main objectives of PINBio program and projects are:

- To document, collect, cultivate and make inventories of biological diversity, including indigenous knowledge use of biological resources:
- To assess conservation status of biological resources and ensure development of effective strategies for their maintenance and preservation:

- To standardize mixed remedies or herbal preparations from traditional medicine and ensure their safe and effective use:
- To discover and evaluate bio-active compounds from PNG's rich biological resources as agents to treat and prevent human diseases:
- To discover and evaluate natural products that may be used as agrochemicals to improve crop production and generate economic benefits:
- To discover and evaluate potential uses of genetic material:
- To conserve biodiversity and facilitate benefits through carbon trading mechanisms:
- To develop, share and manage information/ database related to biodiversity:
- To provide facilities and resources for building capacity and to facilitate transfer of technology:
- To seek protection of biological resources through Intellectual Property Laws (IPR) including patents.

The major research and development of PINBio focus on the development and establishment of programs are outlined below. These are:

1. Biodiversity Inventory
2. Biodiscovery
3. Agrobiodiversity
4. Biotechnology
5. Biodiversity conservation through carbon-offsets and trade initiatives
6. Biodiversity Database and Management System
7. Policy and Legislation
8. Training and Infrastructure Development
9. Education and Awareness

There are no PINBio projects *per se* at present. However there have been institutional activities and consultations supporting and/or supportive of PINBio activities, facilitation for collaborative arrangements, projects and also negotiations, between some international organizations and some members of the PINBio network. Originally DEC was the coordination body for PINBio but at present UPNG is functioning as its secretariat rather than DEC.

However, according to Government of PNG (2010), the status of PINBio is currently "confusing" and many stakeholders recognize that it is not very active. There are recommendations for its re-strengthening and establishment for effective implementation. In a document recently prepared by NGOs concerning biodiversity conservation to DEC[19], they mentioned "the demise of PINBio in 2009."

7.2.3 Forest Research Institute (FRI)

Forest Research Institute (FRI) in Lae is a branch in PNGFA, which is considered to be in charge of biodiversity related issue. FRI is a research organization with around 50 staff members. They have extensive collections of insect specimens and plant specimens.

FRI has the biggest herbarium in PNG with 300,000 specimens of 20,000 species, which is the only herbarium with official international code (LAE) in PNG. FRI has insectarium as well. The collection includes lower and higher plants. 5 years ago, preparation of digitized database of the collection named "PNGPlants" started with assistance of Sydney herbarium. Digitization is on going and it is expected to take 25 years. The database is accessible on the internet at

[19] "A protected Area Policy for a National Protected Areas System for Papua New Guinea – Comments from the Non Government Organisations" prepared in Mar. 2012 by many NGOs on biodiversity conservation

http://www.pngplants.org/PNGdatabase. Collection in the insectarium in FRI is limited to insects in forest. Insect collection in all types of ecosystems is managed by NARI. FRI also have educational function and *ex-situ* conservation utilizing their botanical garden.

FRI implemented projects to improve its forest research with assistance from JICA from 1989 to 2002 including construction of building, provision of equipment, dispatch of Japanese experts, training of staff in FRI, etc. FRI also received GEF Trust Fund through PINBiod from 2004 to 2007. FRI in partnership with Darwin Initiative implemented the Waria Valley Community Conservation and Sustainable Livelihoods Programme from 2006-2009[20].

7.2.4 Papua New Guinea University of Technology (UNITECH)

UNITECH is the only technical university in PNG and it is also the only university to have a Department of Forestry. The Department accommodates around 18 teaching staff (including 3 expatriates) and 125 students including 7 post graduates. Annually, they have 25-35 graduates from the Department and many of them work for the public sector (such as PNGFA), NGOs, consultancy, and other environment- related jobs.

The Head of the Department, Dr. Larry Orsak, is originally from the US but has been working in PNG for many years. He started his career as a trained entomologist and his extensive conservation-related job experience include the Kikori Integrated Conservation-Development Project, the Bismarck-Ramu Integrated Conservation-Development Project, and numerous biodiversity assessments and conservation education.

7.2.5 National Research Institute (NRI)

NRI is an independent, policy-oriented think tank funded by the government. Their research area covers social, political and environmental issues. There are currently 65 working staff including 20 researchers. They have three main areas of research, such as 1) Governance, 2) wealth creation and 3) people pillar (including poverty alleviation). The Research Fellow on Environment, Mr. Nalau Bingeding, specifically deals with political issues related to climate change, such as renewable energy, forest management, and REDD+.

7.2.6 National Agricultural Research Institute (NARI)

The PNG National Agricultural Research Institute (NARI) was established in 1996 as a public-funded research organization to conduct and foster applied and adaptive research into broad topics related to agriculture. Besides, NARI is responsible for providing technical, analytical, diagnostic and advisory services and up-to-date information to the agriculture sector in PNG. The Institute used to be under the Ministry of Agriculture and Livestock, but was brought under the Ministry of Higher Education, Research, Science and Technology in 2002.

NARI has been entrusted by the Government to look after the rich genetic diversity of the agro biodiversity including food crop species of the country. NARI has taken an active interest in increasing crop production and productivity through improving crop quality by using superior genetic materials from the national germplasm collections and gene banks from abroad.

Over the years NARI, together with the DAL, undertook number of germplasm collecting expeditions throughout the country, collected genetic diversity of sweet potato, banana, taro, yam, cassava, aibika, fruits & nuts and traditional vegetables. These collected germplasm were assembled into field collections that formed the bases of the National Germplasm Collections of

[20] http://darwin.defra.gov.uk/project/15041/

sweet potato (at Aiyura & Keravat), banana, yam, cassava & aibika (at Laloki), taro (at Bubia) and fruits, nuts and traditional vegetables (at Keravat).

There are no formal arrangements in place in collecting and conserving these under-utilized crop species. No national inventory or survey has taken place to take stock of the different species and kinds of plant species available in the country. PNG NARI has taken initiative in collecting some species of the under-utilized crop species, especially the fruits; nuts and traditional vegetables and a small *ex-situ* collection of these germplasm are maintained at NARI Research Centre, Keravat.

7.3 NGOs

7.3.1 World Wildlife Fund for Nature (WWF) Melanesia Programme

WWF in PNG is a part of Melanesia Programme, which includes PNG and Solomon Islands, directed by the Director in Brisbane. PNG Office currently has 23 staff members, but due to difficult financial situation, the number of staff is going to be reduced to 16. WWF in PNG is working on the projects in Western Province, Sepik, Manus, and Kikori area. Their conservation activities also covers a wide range from advocacy, research, assistance to DEC for protected area management, environmental education, and local community support (Figure 7-7 WWF Project Sites in PNG and Surrounding Countries). For example, they made an assessment of the Effectiveness of protected area management in PNG and published the report in 2009.

Their PNG office is now located in Port Moresby but soon they are moving to Madang because of expensive office rent and commodity price in Port Moresby.

Source: WWF

Figure 7-7 WWF Project Sites in PNG and Surrounding Countries

7.3.2 Conservation International (CI)

Conservation International (CI) is a non-profit environmental organization whose mission is to protect nature, and its biodiversity, for the benefit of humanity. In PNG, Mr. David Mitchell, Australian with 30 years experience in PNG is assigned as CI-Papua New Guinea country director. CI-PNG has 2 supporting staff and 5 technical staff. Since 2000, under CI he assisted marine conservation program in Milne bay. The programme was funded by UNDP mobilizing GEF Trust Fund. CI's current main projects and activities are as follows: -

1. "Learning and training network" in collaboration with CLMA (Centre for Locally Managed Area) focusing on marine areas under CTI (as shown in Figure 5-1 Implementing Structure for CTI in PNG) [21]
2. Food Security and Climate Change Programme with AusAID and NARI (which finishes in June 2013)
3. Survey as part of PNG LNG Project: Biodiversity assessment would be conducted for 27 days from May to June 2013. CI would hold a workshop at UPNG in April on biodiversity offset planned in NBSAP. They would discuss setting up a conservation area there. Exxon Mobil targets three areas for offset on voluntary basis, accordingly, CI plans on discussing the formalization of the biodiversity offset process.
4. Tree Kangaroo Conservation Program in Huon Peninsula conservation area

7.3.3 World Conservation Society (WCS)

WCS is the oldest international environmental NGO in PNG. They opened a research station and an office in Goroka in 1985. As of 2013, they have 40 staff members in total throughout project sites in PNG, including 3 officers at Goroka head office. Originally they started from providing training opportunities for university students in biological and ecological research methodologies, and later they moved into hands on conservation activities with more emphasis on each project sites. Under their training programme, including 25 master degrees holders, 200 students have been trained, a lot of them working for environmental section of mining industries, consulting firm, UPNG, etc. Recently they conducted biodiversity assessment in Hidenburg Wall, a possible site for World Heritage Inscription. In the field study, they discovered around 100 new species, including 3 new species of mammals.

7.3.4 Greenpeace

Greenpeace is an international environmental NGO which is active in 40 countries in the world. However, their presence in PNG is not so big with only 1 staff member (PNG Forest Campaigner). The main area of activity is advocacy on issues such as protected area management, forestry management policy, and climate change.

7.3.5 The Nature Conservancy (TNC)

Though the Study Team had no chance to interview to The Nature Conservancy (TNC), many stakeholders consider TNC as an international NGO comparable with WWF and CI for its significant contribution to biodiversity conservation in PNG. According to their website[22], TNC's has terrestrial projects in Madang centred on the threatened lower montane forests of the Adelbert Mountains and marine projects in Kimbe Bay.

7.3.6 International Union for Conservation of Nature (IUCN)

As stated in Section 6.4, IUCN is assisting Mangrove Rehabilitation for Sustainably Managed Healthy Forests (MARSH) project funded by USAID in PNG, Solomon Islands and Vanuatu.

7.3.7 PNGCLMA

PNGCLMA is a national NGO supporting coastal local communities to better manage community-based marine protected areas (also called locally managed areas, hence the name of the NGO). It is a part of a larger network called LMMA (Locally Managed Marine Area) Network based in Fiji and working in the Philippines, Indonesia, Palau, PNG, Pohnpei and

[21] http://www.earth2ocean.com/pdfs/TNC%20Scoping%20study_DSEWPaC_Final220612.pdf
[22] http://www.nature.org/ourinitiatives/regions/asiaandthepacific/papuanewguinea/index.htm

Solomon Islands. Although they only work with marine protected area and not with terrestrial area, they are hoping to apply their experience to terrestrial protected areas in the future, so they dropped the word “marine” from the name of the organization.

Interest in the LMMA concept began in PNG in when project representatives from Kimbe and Madang attended a regional LMMA workshop in Fiji in 2000. In 2002, the concept for the PNG LMMA Network was first introduced at the national PNG Marine Conservation Workshop, and the PNG country LMMA network was formed. In the years that followed, several workshops were held throughout PNG to introduce the LMMA Network as well as the Community-Based Adaptive Management concept and the Network's Learning Framework. In 2009, PNGLMMA became a legally registered not-for-profit organisation based in Port Moresby, to operate as an independent arm of the regional LMMA Network in Papua New Guinea.

The mission of PNGCLMA is to empower local communities to achieve their marine resource management goals by building their capacity in key LMMA management skills, providing a vehicle for sharing their stories and lessons, and supporting the establishment of key partnerships. Strategies include capacity building with community projects; partnership building; awareness, outreach, marketing, and communications; fundraising and sustainability; networking and learning; and governance, management, and administration. The number of staff is 10 including part-time staff and volunteers. They seem to play an important role in bridging a gap between local communities, government, international NGOs, and funding agencies.

They currently work with 20 member communities in 5 priority provinces (Kimbe, Manus, Milne Bay, Madang, New Ireland) who pay small membership fees to PNGCLMA. The number of staff is 10 including part-time staff and volunteers.

7.3.8 PNG Institute of Biological Research (IBR)

IBR is a national NGO based in Goroka. It used be a part of WCS, but became an independent NGO in 2008. They have 3 main areas of programs; 1) Training of scientists and conservationists, 2) Research on biodiversity and culture, and 3) Awareness and outreach. Their research interest includes not only ecological and biological disciplines but also cultural, ethnological, and anthropological fields. They offer annual training courses for the senior college students from UPNG, UNITECH, University of Goroka, etc. This is somewhat a way to supplement the general lack of practical field components in the current university biology curriculums in PNG. They also offer 2 years in-house training and research opportunities equivalent to post-graduate level students (currently 6 students).

Through their activities, they have gained expertise in field survey techniques. Some of the species they are working on for research and conservation are tree kangaroo, long-beaked echidna, and Bulmer’s fruit bat.

7.3.9 Research and Conservation Foundation (RCF)

RCF is the oldest of national environmental NGOs, established in 1986 by WCS. It started its activity as a local partner for management of crater mountain WMA, the big area in the three provinces, Simbu, Eastern highland and gulf provinces. It is the 2nd largest WMA in PNG. They currently run two programs with 20 staff members; Nature Resource Management Program and Conservation Education Program. For Nature Resource Management Program, the main activities are to support local communities to better manage their protected area by promoting alternative livelihood such as ecotourism in Crater Mountain WMA. For conservation of Education Program, the ECF works with local school teachers by providing training and teaching tools to build the capacity for environmental education in schools.

As stated in Section 3.4, the Crater Mountain WMA was a target site for one of the ICDPs during the 1990s. RCF also worked in the ICDP (1995-2005), applying eco-tourism, livelihood, and income generation activities (like production of coffee and vanilla) in the community. However, they are now facing difficulty to pursue ICDP model with proposed mining in the Crater Mountain area. Because the company is directly dealing with local landowners, it is a little hard for RCF to stop the community from supporting the mining development. In this condition, RCF is questioning the model of ICDP and the donor is now reconsidering the model.

In 1998, the Japanese government provided a vehicle and radio communication equipment to RCF mobilizing its Grant Aid for Grassroots Human Security.

7.3.10 New Guinea Binatang Research Center

The New Guinea Binatang Research Centre is a non-profit organisation for entomological study ("Binatang" means insect in Melanesia Pidgin) located in Madang Province. Though the Study Team did not have a chance to visit or interview the Centre, many stakeholders considered it as a non-governmental research institute contributing much in biodiversity information management. According to their website[23], they have approximately 20 staff members and it is devoted to:

- training Papua New Guineans in biology on all levels, from field technicians through paraecologists to postgraduate students
- advancing biodiversity research in PNG
- developing educational and nature conservation programmes,
- targeting grassroots audiences

7.3.11 Eco-Forestry Forum

Eco-Forestry Forum is an umbrella organisation of NGOs established in 2000. 12 staff members are working for the secretariat of the Forum in Port Moresby. The Eco-Forestry Forum is made up of more than 20 NGOs active in the field of forestry and aims to promote the idea of eco-forestry. The Forum not only provides for information exchange and awareness raising but also actively engages the government on forest policy issues. It produces a quarterly newsletter called *Iko-Forestry Nius*. The Eco-Forestry Forum is a member of PNG FSC National Working Group (Section 4.5.3) and has also stood at the basis of the establishment of FORCERT, an organisation that supports small-scale sawmilling ventures to obtain FSC certification.

Another function of the forum is contribution to strategic constitutional cases for forest conservation. In 2010, the Forum in legal case challenged validity of FMA of 5,000 ha in Kamula Doso area given to Rimbunan Hijau, for logging without proper National Forest Plan (The plan in 1996 is not considered to be valid). As the government did not carry out any action to stop the logging, the Forum legally challenged and won the case.

The Forum is in the Technical Working Group for OCCD and also in the WG for national forestry board. Its members are working in various communities. Activities of the Forum are not on project basis, but at a policy development level.

7.3.12 Forest Product and Certification Service (FORCERT)

Forest Product and Certification Service (FORCERT) is a PNG based, not-for-profit company that promotes sustainable forest management through providing certification and marketing services of forests and products for local small-scale producers and timber yards. FORCERT

[23] http://www.entu.cas.cz/png/index.html

uses FSC Certification as a management, marketing and networking tool. FORCERT is not a certifier of FSC, but a certificate holder working with the local community for accessing certification. It links community forest enterprises to timber yards, and combines the output of these yards to service overseas markets. FORCERT believes in a fair and transparent independently certified forest product trade that recognises the important role of local landowners and ensures the different values of their forests are appreciated and maintained[24]. FORCERT is a member of PNG FSC National Working Group (FSC, 2010).

7.3.13 Mahonia Na Dari

Mahonia Na Dari is another active NGO in marine conservation. Mahonia Na Dari means "Guardian of the Sea" in the local language of thet alasea Peninsula in West New Britain Province. Mahonia Na Dari established in 1998, through co-operative effort between The Nature Conservancy, the European Union Islands Regional Environmental Programme and Walindi Plantation Resort. It was formed to provide Marine Environment Education Program (MEEP) to the local population in West New Britain Province and the New Guinea Islands region.

Since the inception of the organization in 1998, Mahonia Na Dari has reached out to more than 150,000 students and teachers, local communities and other organizations who are interested in marine education. In the national arena, Mahonia Na Dari is a leading advocate for marine conservation with strengths in marine education and awareness. It facilitates marine research and an increased understanding of the marine environment. These programs have promoted the protection of PNG's abundant biodiversity by promoting sustainable use of marine resources by the community[25].

7.3.14 Port Moresby Nature Park

Situated next to the vast campus of the UPNG, Port Moresby Nature Park (formally the National Capital Botanical Gardens) is PNG's only combined botanical and zoological parks and gardens dedicated to the promotion of PNG's flora and fauna.

Originally the garden was established by André Millar in 1971 as a teaching garden for the UPNG Biology Department and also as a nursery to supply plants for the University grounds. After Mrs. Millar's departure in the late 1970's, the gardens experienced problems with management and funding and, eventually, the condition declined from a beautiful garden to a desolate piece of bushland. In 1993, the National Capital District Commission (NCDC) took over the assets of the gardens and established a major redevelopment program[26].

In 2011, NCDC, owner of the park dissolved the managing company and granted management of the facility to the Port Moresby Nature Park Trust in early 2012. The park is overseen by a board of trustees and managed by Australian general manager and curator with extensive international zoo experience. NCDC itself, Papua New Guinea Sustainable Development Program Ltd. (PNGSDP), PNGLNG, and other major private companies in PNG donated to the trust fund for the Park.

A number of major upgrades occurred since the organisational change and will continue to occur over the next few years. The park is home to many native animals including bird of paradise, tree-kangaroos, wallabies, snakes, crocodiles, hornbills and multiple parrot species. The ground offers a lush change from the hustle and bustle of Port Moresby City and is home to

[24] http://www.forcert.org.pg
[25] http://mahonianadari.org
[26] http://web.archive.org/web/20121030182107/http://www.ncbg.org.pg/

the only tract of rainforest within the Capital City. Thousands of tropical plant species are found within the area.

Figure 7-8 Tree Kangaroo Cage in Port Moresby Nature Park

With the current management and business plan, the Port Moresby Nature Park has the potential to be the best zoological institution in PNG. A sound strategy and three-year business plan are in place and there is solid community backing. Although the new management has only been in place for a short period, important improvements to some of the animal exhibits have already been implemented, and priority needs for the park have been identified. Included in the former is a rainforest walk featuring all three species of cassowary found in PNG, and a new exhibit for two tree kangaroo species (Figure 7-8).

Zoos Victoria (governing body of three zoos in Victoria State of Australia) through a three-year sister zoo agreement, has partnership with the Port Moresby Nature Park. The partnership focuses on strengthening the capacity of park staff to effectively manage the animal and plant collections, deliver innovative learning programmes and engage with the people of Port Moresby[27].

7.4 Donors

7.4.1 UNDP

UNDP has its office in Port Moresby and manages the on-going Community-based Forest & Coastal Conservation and Resource mobilizing GEF-4 and assisting DEC in formulating another project for the National Protected Areas System as stated in Section 6.1 and 6.2.

UNDP also coordinates among Government of PNG and various donors by organising a forum. In the framework, in November last year (2012) the Minister for Environment and Conservation called all the donors and requested their assistance for biodiversity conservation. In 2008, they arranged a similar donor meeting on climate change issues.

[27] http://www.waza.org/en/site/conservation/waza-conservation-projects/overview/building-institutional-capacity-of-the-port-moresby-nature-park

The United Nations Collaborative Programme on Reducing Emission from Deforestation and Forest Degradation in Developing Countries (UN-REDD) is a collaborative programme for REDD+ among UNDP, FAO and UNEP.

In their office in PNG, UNDP has 2-3 officers in charge of biodiversity conservation and 4 officers in charge of climate change.

7.4.2 USAID

USAID opened its satellite office in Port Moresby in 2011, Pacific Islands Office in Port Moresby and assigned a regional director there. To maximize the impact of their assistance, the office focuses on issues that pose the greatest socio-economic threat to the Pacific Small Island Developing States (PSID) including PNG. The first the identified issues is "Climate Change and Environmental Degradation." The Pacific Islands region is among the most vulnerable in the world to the adverse effects of climate change, and is also least able to respond. USAID's assistance will increase the adaptive capacity of the PSIDS to mitigate the negative impacts of global climate change.

In line with the direction, as stated in Section 6.4, USAID funds to Mangrove Rehabilitation for Sustainably Managed Healthy Forests (MARSH). The objective of MARSH is to increase the resilience of communities to the negative effects of climate change by decreasing deforestation and forest degradation. They also funded to Lowering Emission of Asian Forest Program (LEAF), a five year, $20 million dollar program aimed at building technical capacity for REDD+[28]. Another programme on climate change is Coastal Community Adaptation Program (CCAP) which was just launched to engage communities to produce integrated land use plans.

According to the regional director, USAID has no significant programme purely on biodiversity conservation. USAID still provides a limited fund to BALANCED Project and the Tree Kangaroo Conservation Program (TKCP) targeted to YUS Conservation Area.

7.4.3 AusAID and Australian Government

As stated in Section 6.3, Australian Government has assisted the Kokoda Initiative since 2008. ASUAID also provides assistance to projects, mobilizing International Forest Carbon Initiative Concept Development Grants. Those include the project by WCS in Manus, not only for REDD+ but also biodiversity conservation, another similar project by TNC in Madang, etc.[29]

7.5 Private Companies Active in Biodiversity Conservation

7.5.1 Exxon Mobil

Esso Highlands Limited (EHL), a subsidiary of Exxon Mobil Corporation, is the operator of the Papua New Guinea Liquefied Natural Gas Project (PNG LNG), which includes gas production and processing facilities, liquefaction and storage facilities, and more than 700km of related pipelines. As part of the development activities related to the project, EHL has developed a Biodiversity Strategy, which outlines how PNG LNG has and will continue to manage terrestrial biodiversity in its Upstream Project Area[30].

As part of this Biodiversity Strategy, EHL is also developing an extensive technical rationale for biodiversity offset selection, scoping potential offset areas, activities and partners and assessing

[28] http://www.climatefocus.com/pages/lowering_emissions_in_asias_forests_program
[29] http://www.ausaid.gov.au/aidissues/environment/Pages/forest-carbon.aspx
[30] http://www.ipieca.org/topic/biodiversity/biodiversity-case-studies/exxonmobil-detailed-program-protecting-biodiversity

the feasibility of a number of options to implement the plan. The footprint of the development by PNG LNG is 3,000ha in total including edge and barrier effects. The target area is in the southern highland, mid-high mountain area. 50,000ha in 3 different sites were selected for offsetting.

The pipeline continues through 8 km in the catchment area of Lake Kutubu (WMA and also Ramsar Wetland). Oil Search Ltd. (a big company 29% of PNG LNG) in partnership with Exxon Mobil 1) helping people, 2) supporting facilities, and 3) promoting conservation work (survey, management plan) for conservation of Lake Kutubu.

7.5.2 PNG Sustainable Development Program Ltd. (PNGSDP)

PNG sustainable Development Program Ltd. (PNGSDP) was established in 2002, when BHP Billiton, an Australian multinational mining and petroleum company divested its 52% shareholding in Ok Tedi Mining Limited (OTML) following concerns about the long-term environmental impact of the mine. PNGSDP has the task of applying the funds coming from OTML which are assigned for the development of the PNG, in particular the people of the Western Province.

PNGSDP's objective is to support selected sustainable development programs through projects and initiatives to benefit PNG. When the Ok Tedi Mining operation ends in the Western Province around 2013, our charter is to ensure that on-going and lasting benefits remain among the people of the Western Province and PNG as a whole. PNGSDP also have timber concession and they are certified for FSC.

Chapter 8 Recommendations for Cooperation

8.1 Narrative Summary of the Recommended Project

Based on the facts found and analysed in the previous chapters, the Study Team proposes a project comprising of outputs and activities responding to the needs of Government of PNG and the people in PNG for biodiversity conservation. The logical framework of the project is as shown in a format of Project Design Matrix (PDM) in Annex 1. The narrative summary extracted from the PDM is as follow:

Program Title: Biodiversity Conservation toward Aichi Target
Target Group: DEC (as the implementing agency), other national agencies, local government(s), selected NGOs and the people of PNG
Target Area: Areas with high biodiversity conservation value in PNG, with emphasis on target protected area(s) (to be identified)[31]
Duration: 2014-2019 (5 years)

Overall Goal: Government of PNG takes effective and urgent action to halt the loss of biodiversity by 2020 in order to ensure that ecosystems in PNG are resilient and continue to provide essential services, thereby securing the country's variety of life, and contributing to human well-being, and poverty eradication.[32]

Project Purpose: Capacity of the government agencies for biodiversity conservation in PNG is strengthened.

Output 1: The capacity of the government agencies to manage biodiversity information as basis for Access and Benefit Sharing (ABS) is strengthened.

(Activities under Output 1)
1.1. Develop Clearing-House Mechanism of biodiversity information in PNG, capturing existing databases inside and outside of PNG.
1.2. Develop capacity of development and utilization of GIS (at DEC, PNGFA, etc.) for biodiversity conservation based on what has been developed through the JICA funded REDD+ Project.
1.3. Conduct seminars and workshops to improve understanding of the officers in charge and other stakeholders on the context of ABS and the necessity of domestic legislation for ABS.
1.4. Raise awareness of the decision makers to promote PNG's signing and ratification of Nagoya Protocol and development of domestic ABS legislation.
1.5. Present outcome of the Project at international conference(s) at worldwide and/or regional levels.

[31] Target protected areas in discussion are as follows: -
- Varirata National Park: for application of MAB
- Marine protected areas: Milne Bay Seascape (in the World Heritage tentative list) and/or the WMAs in Madang province
- Upper Sepik River Basin (proposed Ramsar Wetland as well as a site in the tentative list of World Heritage sites)
- Trans-Fly Complex (in the World Heritage tentative list) including Tonda WMA (Ramsar Wetland)
- Kutubu WMA (Ramsar Wetland)
- The other sites in the World Heritage tentative list which are not covered by technical assistance under Kokoda Initiative or GEF, such as 1) Huon Terraces (Morobe Province), 2) Sublime Karsts of PNG (partly covered by GEF4 Project), 3) Kikori River Basin / Great Papuan Plateau (Gulf, Western and Southern Highlands Provinces)

[32] Adapted from the statement of the "Mission" of the Strategic Plan 2011-2020, including Aichi Biodiversity Targets.

Output 2: A model of protected area management is established following the new National Protected Areas System (NPAS) and requirement of international initiatives (such as MAB, Ramsar Convention and/or World Heritage convention).

(Activities under Output 2)
2.1. Identify appropriate target protected area(s) referring to the new NPAS and GEF funded capacity building for protected area management.
2.2. Plan application of the international initiatives to the target protected area(s) to develop a model of the new NPAS.
2.3. Nominate Varirata National Park (as Core Area) and its surrounding area (as Buffer Zone and Transition Area) as Biosphere Reserve under Man and Biosphere Programme.
2.4. Nominate Upper Sepik River Basin or another site as Ramsar Wetland (optional).
2.5. Nominate a site under the Tentative List as the World Heritage Site (optional).
2.6. Conduct scientific biodiversity assessment in the target Protected Areas (and potential area for new MPAs)
2.7. Establish feasible resource monitoring program for adaptive management
2.8. Prepare feasible management plan(s) of the target protected area(s) utilizing the international initiative(s).
2.9. Manage the target protected area(s) following the plan.

Output 3: The people of PNG have better understanding and appreciation of the conservation of biodiversity.
3.1. Identify agents (agencies, NGOs, etc.) and the media for effective public awareness of biodiversity conservation in PNG.
3.2. Plan effective public awareness activities utilizing Output 1&2 together with the agents and the media.
3.3. Implement the awareness plan.
3.4. Assess change of awareness and attitude of the target of the awareness.

Inputs:
(Japanese side)
Personnel
- Long-term experts: Project Leader, Project Coordinator, Protected Area Management, Environmental Awareness
- Short-term experts: experts in specific field upon mutual agreement

Training
- Training in specific fields in Japan
- Training in specific fields in the third country (e.g. the Third Country Training Programme under JICA assisted by SDBEC in Sabah, Malaysia)

Machinery and equipment
- A vehicle for technical assistance by the JICA experts
- Equipment necessary upon mutual agreement (such as facilities in the target protected areas, etc.)

Operational cost
- Employment of local experts
- Airfare and hotel fee to participate in the international conference(s)(not including daily allowance)

(PNG side)
Personnel
- Formation of Project Steering Committee chaired by Project Director
- Project manager (full-time)
- Counterpart personnel for Japanese experts (full-time)

- Coordinator with local governments

Office space
- At DEC and the pilot protected area(s) (if required)

Operational cost
- Budget for project activities by the counterpart personnel (including domestic travel cost, allowance and accommodation)
- International travel allowance (other than airfare and accommodation covered by JICA)
- Police escort

8.2 Draft Application Form for Japan's Technical Cooperation

The Study Team drafted an application form of the recommended project for Japan's Technical Cooperation, and then had discussion on it with the Acting Secretary and other officers in charge of DEC on 25 May, 2013. Based on their comments during the discussion, the Study Team revised the draft as shown in Annex 2 and left it with DEC for finalisation and submission to JICA through Government of PNG.

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WWF. 2009 *An Assessment of the Effectiveness of Papua New Guinea's Protected Areas Using WWF's RAPPAM Methodology.*

Appendix 1: Project Design Matrix (PDM) of the Recommended Cooperation

PROJECT DESIGN MATRIX (PDM)

Project Name: Biodiversity Conservation toward Aichi Biodiversity Targets Duration: 2014-2019 (5 years) Date:5 June 2013
Project Area: Areas with high biodiversity conservation value in PNG, with emphasis on target protected area(s) (to be identified)[1]
Target Group: DEC (as the implementing agency), other national agencies, local government(s), selected NGOs and the people of PNG

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal Government of PNG takes effective and urgent action to halt the loss of biodiversity by 2020 in order to ensure that ecosystems in PNG are resilient and continue to provide essential services, thereby securing the country's variety of life, and contributing to human well-being, and poverty eradication.[2]	-	-	
Project Purpose Capacity of the government agencies for biodiversity conservation in PNG is strengthened.	-	-	-
Outputs 1) The capacity of the government agencies to manage biodiversity information as basis for ABS is strengthened. 2) A model of protected area management is established following the new National Protected Areas System (NPAS) and requirement of international initiatives (such as MAB, Ramsar Convention, IUCN Protected Area Categories and/or World Heritage convention). 3) The people of PNG have better understanding and appreciation to the conservation of biodiversity.	1. Actions toward signing, ratification of Nagoya Protocol and establishment of domestic ABS mechanism. 2. Inscription of at least one protected area as Biosphere Reserve under MAB, Ramsar Wetland, or World Heritage convention. 3. Positive change of the target group of the awareness activity in their awareness and attitude for biodiversity conservation.		-

[1] Target protected areas in discussion are as follows: -
- Varirata National Park: for application of MAB
- Marine protected areas: Milne Bay Seascape (in the World Heritage tentative list) and/or the WMAs in Madang province
- Upper Sepik River Basin (proposed Ramsar Wetland as well as a site in the tentative list of World Heritage sites)
- Trans-Fly Complex (in the World Heritage tentative list) including Tonda WMA (Ramsar Wetland)
- Kutubu WMA (Ramsar Wetland)
- The other sites in the World Heritage tentative list which are not covered by technical assistance under Kokoda Initiative or GEF, such as 1) Huon Terraces (Morobe Province), 2) Sublime Karsts of PNG (partly covered by GEF4 Project), 3) Kikori River Basin / Great Papuan Plateau (Gulf, Western and Southern Highlands Provinces)

[2] Adapted from the statement of the "Mission" of the Strategic Plan 2011-2020, including Aichi Biodiversity Targets.

Activities	**Inputs**	**Pre-conditions**
1-1 Develop Clearing-House Mechanism of biodiversity information in PNG, capturing existing databases inside and outside of PNG. 1-2 Develop capacity of development and utilization of GIS (at DEC, PNGFA, etc.) for biodiversity conservation based on what has been developed through the JICA funded REDD+ Project. 1-3 Conduct seminars and workshops to improve understanding of the officers in charge and other stakeholders on the context of ABS and the necessity of domestic legislation for ABS. 1-4 Raise awareness of the decision makers to promote PNG's signing and ratification of Nagoya Protocol and development of domestic ABS legislation. 1-5 Present outcome of the Project at international conference(s) at worldwide and/or regional levels. 2-1 Identify appropriate target protected area(s) referring to the new NPAS and GEF funded capacity building for protected area management. 2-2 Plan application of the international initiatives to the target protected area(s) to develop a model of the new NPAS. 2-3 Nominate Varirata National Park (as Core Area) and its surrounding area (as Buffer Zone and Transition Area) as Biosphere Reserve under Man and Biosphere Programme. 2-4 Nominate Upper Sepik River Basin or another site as Ramsar Wetland (optional). 2-5 Nominate a site under the Tentative List as the World Heritage Site (optional). 2-6 Conduct scientific biodiversity assessment in the target Protected Areas (and potential area for new MPAs) 2-7 Establish feasible resource monitoring program for adaptive management 2-8 Prepare feasible management plan(s) of the target protected area(s) utilizing the international initiative(s). 2-9 Manage the target protected area(s) following the plan. 3-1 Identify agents (agencies, NGOs, etc.) and the media for effective public awareness of biodiversity conservation in PNG. 3-2 Plan effective public awareness activities utilizing Output 1&2 together with the agents and the media. 3-3 Implement the awareness plan. 3-4 Assess change of awareness and attitude of the target of the awareness.	(PNG side) Personnel - Formation of Project Steering Committee chaired by Project Director - Project manager (full-time) - Counterpart personnel for Japanese experts (full-time) - Coordinator with local governments Office space - At DEC and the pilot protected area(s) (if required) Operational cost - Budget for project activities by the counterpart personnel (including domestic travel cost, allowance and accommodation). - International travel allowance (other than airfare and accommodation covered by JICA) - Police escort (Japanese side) Personnel - Long-term experts: Project Leader, Project Coordinator, Protected Area Management, Environmental Awareness - Short-term experts: experts in specific field upon mutual agreement Training - Training in specific fields in Japan - Training in specific fields in the third country (e.g. the Third Country Training Programme under JICA assisted SDBEC in Sabah, Malaysia) Machinery and equipment - A vehicle for technical assistance by the JICA experts - Equipment necessary upon mutual agreement (such as facilities in the target protected areas, etc.) Operational cost - Employment of local experts - Airfare and hotel fee for the cost to participate in the international conference(s)(not including daily allowance)	- The required inputs from the both PNG and Japanese sides are secured. - DEC, UPNG, PINBio and other critical stakeholders in PNG's national Clearing-House Mechanism agree to develop CHM under the Project. - Political will of Government of PNG to inscribe the Biosphere Reserve, World Heritage and/or Ramsar Wetland is confirmed. - There is no inconsistency or overlapping among the Project, the UNDP-GEF projects for protected area management, Kokoda Initiative and other donors' inputs on biodiversity conservation. - An initial mechanism to mobilize local administrations to start the Activities in the target protected areas is established.

Appendix 2: Draft Application Form for Japan's Technical Cooperation (handed to the Department of Environment and Conservation on 25 May 2013)

APPLICATION FORM FOR JAPAN'S TECHNICAL COOPERATION

1. **Date of Entry**: Day 25 Month May Year 2013

2. **Applicant**: The Government of Papua New Guinea

3. **Technical Cooperation (T/C) Title**: Biodiversity Conservation toward Aichi Target

4. **Type of the T/C ※select only one scheme.**

   ☑ Technical Cooperation Project / Technical Cooperation for Development Planning

   ☐ Individual Expert ☐ Individual Training ☐ Equipment

5. **Contact Point (Implementing Agency):** Department of Environment and Conservation (DEC)

   Address: BeMobile Building, Waigani, National Capital District, PNG
   (Postal address) PO Box 6601 Boroko, National Capital District, PNG
   Contact Person: Mr. Gunther Joku, Acting Secretary of DEC
   Tel. No.: (675)3433637 Fax No. (675)3238371
   E-Mail: guntherjoku@yahoo.com, guntherjoku@gmail.com

6. **Background of the T/C**

   (Current conditions of the sector, Government's development policy for the sector, Issues and problems to be solved, Existing development activities in the sector, the Project's priority in the National Development Plan / Public Investment Program, etc.)

6.1. Status of biodiversity in PNG

Papua New Guinea (PNG) is one of the areas with the richest biodiversity in the world with a territory of 462,920 km^2 in total. Lying at the collision line of the Australian and Pacific tectonic plates, PNG is remarkably diverse in terms of landscapes and ecosystems. The island of New Guinea as a whole (combining mainland PNG and Indonesia's West Papua region) is the largest contiguous area of forest in Asia-Pacific and the third largest tropical rainforest on the planet, after the Amazon and Congo forests. PNG is extremely mountainous, with extensive areas above 3,000 m. Rainfall generally exceeds 2,000 mm annually in most areas, with some areas receiving more than 10,000 mm. Rainfall is often seasonal and some areas, particularly in Western and Central provinces, have extensive dry

seasons and which are covered with woodland-savanna. There are more than 5,000 lakes, and extensive river systems and wetlands.

For marine ecosystems, the coral reefs of PNG have a high conservation value due to high biodiversity and relatively pristine status. PNG waters are considered part of the coral triangle, the area of the world's highest known marine biological diversity. Its coral reefs and associated marine habitat are home to about 2,800 species of fishes, about 10% of the world total. Almost all reef types found in PNG waters are within fringing and/or barrier reefs, with an estimated area of 40,000 km^2.

PNG is extremely rich in its species diversity. PNG is one of the 17 Megadiversity Countries identified by Conservation International. The islands of New Britain, New Ireland, Manus and Bougainville in PNG are included in the East Melanesian Islands Hotspot, one of the 34 Biodiversity Hotspots in the world identified by Conservation International. BirdLife International identifies 13 Endemic Bird Areas in PNG. Estimates for the number of vascular plant species for the entire island of New Guinea range from 11,000 to 18,894. About 6% of the world's flora is found in PNG. Endemism probably exceeds 30% for PNG and is well over 70% for Papuasia (the region from New Guinea to the Solomon Islands). PNG also harbours a rich array of animals including an estimated 150,000 species of insects, 341 species of freshwater fishes (82 endemic), 643 species of amphibians and reptiles (328 endemic), 740 species of birds (600 resident; 77 endemic), and 276 species of mammals (69 endemic). Overall approximately a third of the species are endemic to Papua New Guinea and more than 70% are endemic to Papuasia. Concerning endangered species, the current status of species in PNG includes: 1 extinct, 36 critically endangered, 49 endangered, 365 vulnerable, 288 near threatened, 1,289 Least Concern. It is also important to note that there are large gaps in the scientific knowledge of Papua New Guinea's biodiversity.

For genetic diversity particularly that of useful plants, PNG is the secondary centre of genetic diversity for sweet potato, taro, banana, yam, cassava and aibika. Additionally, PNG is blessed with a broad genetic base of food crops that provides for tolerance against major pests and diseases. This means that crops are at less risk of being lost through attacks by pests and diseases unlike those with a

narrower genetic base. PNG is home to many exotic and under-utilized fruits and nuts species and traditional vegetables. It is also a rich haven for crop genetic resources diversity and the center of origin for “noble cane” (sugar cane) and winged bean of New Guinea.

Among the total population of 7.06 million in PNG, over 80% of them are in rural areas and still directly dependent on the natural environment with the rich biodiversity for their subsistence and livelihoods. Forests contribute a rich variety of foods and other items essential for daily survival and economic activity, and form fertile soils for subsistence food production. In total, more than one thousand species of PNG’s plants have been identified that are used for food, medicine, ropes, building materials, stimulants, body decoration and adornment, art, utensils and canoes. Hunting and substantial fishing are still a major activity for many people in rural PNG and forms an important part of customary practice.

PNG’s forests perform a number of crucial ecological functions, the importance of which also tends to be underestimated and unrecognised. The broad range of these free services includes regulation of water catchments and enhancement of water quality; global, regional and microclimate stabilisation; soil and nutrient retention; insect and rodent control; crop pollination; and the maintenance of fish stocks.

6.2. Deterioration of biodiversity in PNG

At present the annual deforestation rate of PNG is comparable with those in Barazil and Indonesia, and far beyond the global average. Change in the extent and condition in PNG’s forests is occurring considerably faster than previously recorded – it is estimated that in 2002, 1.41% of Papua New Guinea’s tropical forests were being deforested or degraded annually.

The major causes of deforestation and forest degradation in PNG have been logging (48.2% of net forest change) and subsistence agriculture (45.6% of net forest change), with lesser causes being fires, plantations and mining.

In addition, recently logging under the name of “agricultural development” based on lease-leaseback scheme called “Special Purpose Agriculture Business Lease” (SABL) increased. It has been reported that SABLs have been misused to skirt

the usual negotiation process of timber concession. It is currently believed that SABLs covering over 5.2 million hectares (11% of the total land area of PNG) have already been issued with an additional 7-8 million hectares pending – though they are on hold due to a government-issued moratorium.

Most coral reefs in PNG are in good condition. However, some reefs near the large towns showed clear signs of damage. As most reefs are fringing reefs that are very close to shore, they are highly sensitive to human influences and changes in land management practices (mining, logging, plantations). Major local-scale threats to the reefs are over-fishing, sediment runoff from land clearing and mining, pollution from urbanization and outbreaks of coral predators such as crown-of-thorns starfish. Unsustainable fishing practices include illegal fishing, overfishing, uncontrolled by-catch, oil spills from ships. The reefs are also declining through global threats such as global warming, coral bleaching, and ocean acidification.

6.3. Unique socio-economic condition concerning biodiversity in PNG

Agricultural biodiversity or genetic diversity of important crops and diversity of useful species in PNG are deeply related to traditional ecological knowledge (TEK) of the indigenous people there. PNG is rich in biodiversity, as well as in cultural diversity, and they are interrelated. The human population of Papua New Guinea makes up a small fraction of the world's total (approx. 0.1%) but represents more than 12% of the world's languages. Loss of certain TEK could be life threatening in particular communities.

PNG is mostly covered by customary land which is owned by customary landholders who are grouped into clans and tribes. These customary lands cover 97% of the land while the State owns only about 3 percent. The challenge for land use as well as biodiversity conservation in PNG is developing an appropriate strategy to enable appropriate access and conservation of the biological resources ensuring that customary landowners gain maximum benefit from the sustainable use and conservation of the resources. Effective protected area system in PNG should be also in consistent with the unique customary land tenure.

6.4. Legislation, policies, plans and their enforcement for biodiversity conservation

Papua New Guinea's strong position on the environment is drawn from the

Preamble of our National Constitution which declares our fourth goal to be PNG's natural resources and environment conserved and used for the benefit of us and our future generation. The National Forest Act, 1991 promotes the opportunity for mainstreaming biodiversity conservation identification of important biodiversity areas can be identified and can be protected by this Act. Similarly, the Organic Law on Provincial and Local-Level Governments (OLPG&LLG) providing an important institutional framework for the planning process in PNG provides the foundation for a system of bottom-up planning for provinces, to ensure the delivery of better and more appropriate services to the local people. Fishery is regulated by Fisheries Management Act of 1998 in PNG.

Same as other parties following the suggestion under Convention of Biological Diversity suggested, PNG formulated National Biodiversity Strategy and Action Plan (NBSAP) in 2007. This document is central to all the programs, projects and activities that PNG has developed or been involved in respect of biodiversity conservation. However, the implementation of NBSAP has been slow, uncoordinated and without proper funding and capacity allocated. Although DEC has led the preparation of the NBSAP, it has not been able to fully implement many of the activities because of resource and capacity constraints.

For establishment of protected areas, there are three laws at the national level enabling gazettal of protected areas for biodiversity conservation purpose, such as 1) National Parks Act, 2) Fauna (Protection and Control) Act, and 3) Conservation Area Act. At present, the National Parks Act is of limited value in PNG today as it relies upon alienation of customary land tenure by the State. This is unlikely to occur, while recently we still have new establishment of Wildlife Management Areas and Conservation Areas on customary owned land under the Fauna (Protection and Control) Act and Conservation Area Act. PNG's current terrestrial protected areas together cover only 4.1% of the total land area.

The current protected area system is small, fragmented, and is highly unlikely to be adequate in providing protection to PNG's extraordinarily high biodiversity. DEC is in charge of monitoring and management of the protected areas. However, at present, most of the protected areas do not have rangers assigned by DEC and there is virtually no monitoring or management activity by DEC, while some of them are monitored or managed by initiatives of local communities.

Whole-of-government land-use planning processes are required to ensure coordinated decision making regarding allocation of land and marine areas to resource development or conservation purposes. Responding these issues, now DEC is discussing to establish National Protected Area System (NPAS) which enables.

Government of PNG has signed and ratified various multilateral environmental treaties (MEA) aimed at biodiversity protection and sustainable use, including CBD, CITES, Ramsar Convention, World Heritage Convention, etc. However, it has not signed or ratified Nagoya Protocol on Access and Benefit Sharing (ABS), which was agreed at CBD-COP10 in 2010. Either there is no single national, provincial or local policy on ABS in PNG and no attempts have been made by the government previously to deal comprehensively with ABS. PNG has one World Heritage site (Kuk Early Agricultural Site) inscribed in 2008 as cultural heritage. There are other seven sites under the national Tentative List of World Heritage site. PNG presently has 2 Ramsar wetlands (Tonda WMA and Kutubu WMA).

7. Outline of the T/C

(1) Overall Goal

(Long-term objective)

Government of PNG takes effective and urgent action to halt the loss of biodiversity by 2020 in order to ensure that ecosystems in PNG are resilient and continue to provide essential services, thereby securing the country's variety of life, and contributing to human well-being, and poverty eradication.[1]

(2) T/C Purpose

(Objective expected to be achieved by the end of the project period. Elaborate with quantitative indicators if possible)

Capacity of the government agencies for biodiversity conservation in PNG is strengthened.

(3) Outputs

(Objectives to be realized by the "T/C Activities" in order to achieve the "T/C Purpose")

[1] Adapted from the statement of the "Mission" of the Strategic Plan 2011-2020, including Aichi Biodiversity Targets.

1) The capacity of the government agencies to manage biodiversity information as basis for Access and Benefit Sharing (ABS) is strengthened.
2) A model of protected area management is established following the new National Protected Areas System (NPAS) and requirement of international initiatives (such as MAB, Ramsar Convention and/or World Heritage convention).
3) The people of PNG have better understanding and appreciation to the conservation of biodiversity.

(4) T/C Site

（In case the proposed T/C assumes a particular area, please enter the name of the target area for the T/C and attach a rough map to the documents submitted. The attached map should be at a scale that clearly shows the project site.）

Areas with high biodiversity conservation value in PNG, with emphasis on target protected area(s) (to be identified)[2]

(5) T/C Activities

(Specific actions intended to produce each "Output" of T/C by effective use of the "Input".)

1-1 Develop Clearing-House Mechanism of biodiversity information in PNG, capturing existing databases inside and outside of PNG.
1-2 Develop capacity of development and utilization of GIS (at DEC, PNGFA, etc.) for biodiversity conservation based on what has been developed through the JICA funded REDD+ Project.
1-3 Conduct seminars and workshops to improve understanding of the officers in charge and other stakeholders on the context of ABS and the necessity of domestic legislation for ABS.
1-4 Raise awareness of the decision makers to promote PNG's signing and ratification of Nagoya Protocol and development of domestic ABS

[2] Target protected areas in discussion are as follows: -
- Varirata National Park: for application of MAB
- Marine protected areas: Milne Bay Seascape (in the World Heritage tentative list) and/or the WMAs in Madang province
- Upper Sepik River Basin (proposed Ramsar Wetland as well as a site in the tentative list of World Heritage sites)
- Trans-Fly Complex (in the World Heritage tentative list) including Tonda WMA (Ramsar Wetland)
- Kutubu WMA (Ramsar Wetland)
- The other sites in the World Heritage tentative list which are not covered by technical assistance under Kokoda Initiative or GEF, such as 1) Huon Terraces (Morobe Province), 2) Sublime Karsts of PNG (partly covered by GEF4 Project), 3) Kikori River Basin / Great Papuan Plateau (Gulf, Western and Southern Highlands Provinces)

legislation.

1-5 Present outcome of the Project at international conference(s) at worldwide and/or regional levels, such as CBD COP12 in Korea in October 2014, Ramsar COP12 in 2015 in Uruguay, etc.

2-1 Identify appropriate target protected area(s) referring to the new NPAS and GEF funded capacity building for protected area management.

2-2 Plan application of the international initiatives to the target protected area(s) to develop a model of the new NPAS.

2-3 Nominate Varirata National Park (as Core Area) and its surrounding area (as Buffer Zone and Transition Area) as Biosphere Reserve under Man and Biosphere Programme.

2-4 Nominate Upper Sepik River Basin or another site as Ramsar Wetland (optional).

2-5 Nominate a site under the Tentative List as the World Heritage Site (optional).

2-6 Conduct scientific biodiversity assessment in the target Marine Protected Areas (and potential area for new MPAs)

2-7 Establish feasible marine resource monitoring program for adaptive management

2-8 Prepare feasible management plan(s) of the target protected area(s) utilizing the international initiative(s).

2-9 Manage the target protected area(s) following the plan.

3-1 Identify agents (agencies, NGOs, etc.) and the media for effective public awareness of biodiversity conservation in PNG.

3-2 Plan effective public awareness activities utilizing Output 1&2 together with the agents and the media.

3-3 Implement the awareness plan.

3-4 Assess change of awareness and attitude of the target of the awareness.

(6) Input from the Recipient Government

(Counterpart personnel (identify the name and position of the Project manager), support staff, office space, running expenses, vehicles, equipment, etc.)

Personnel

- Formation of Project Steering Committee chaired by Project Director
- Project manager (full-time)
- Counterpart personnel for Japanese experts (full-time)
- Coordinator with local governments

Office space

- At DEC and the pilot protected area(s) (if required)

Operational cost

- Budget for project activities by the counterpart personnel (including domestic travel cost, allowance and accommodation).
- International travel allowance (other than airfare and accommodation covered by JICA)
- Police escort

(7) Input from the Japanese Government

(Number and qualification of Japanese experts/consultants, contents of training (in Japan and in-country) courses, seminars and workshops, equipment, etc.)

Personnel

- Long-term experts: Project Leader, Project Coordinator, Protected Area Management, Environmental Awareness
- Short-term experts: experts in specific field upon mutual agreement

Training

- Training in specific fields in Japan
- Training in specific fields in the third country (e.g. the Third Country Training Programme under JICA assisted by SDBEC in Sabah, Malaysia)

Machinery and equipment

- A vehicle for technical assistance by the JICA experts
- Equipment necessary upon mutual agreement (such as facilities in the target protected areas, etc.)

Operational cost

- Employment of local experts
- Airfare and hotel fee to participate in the international conference(s)(not including daily allowance)

8. Implementation Schedule

Month July Year 2014 ～ Month June Year 2019

9. Description of Implementing Agency

(Budget allocated to the Agency, Number of Staff of the Agency, Department/division in charge of the T/C, etc.)

- Department of Environment and Conservation (as the main implementing agency)
- Provincial administration(s), district administration(s) and local level government(s) surrounding the target protected areas
- Forest Authority
- National Fisheries Authority
- University of Papua New Guinea (UPNG)
- PNG Biodiversity Institute (PINBio)
- Forest Research Institute

10. Related Information

(1) Prospects of further plans and actions/ Expected funding resources for the Project:

(If implementing agency plans to take some (future) actions in connection with this proposed project, please describe the concrete plans/action and enter the funding sources for the plans and actions.)

- Establishment of and capacity building for National Protected Area System (NPAS) being assisted by UNDP (GEF) and Australian Government (through Kokoda Initiative)
- Proposal of signing and ratification of Nagoya Protocol
- Restructuring of DEC to Conservation and Environmental Protection Authority
- Review and update of National Biodiversity Strategy and Action Plan
- Proposal to establish Environmental Conservation Endowment Fund
- Feasibility Study of tourism development of Varirata National Park

(2) Activities by other donor agencies, if any:

(Please pay particular attention to the following items:

－Whether you have requested the same project to other donors or not.

No. However, the ongoing project spending GEF (GEF4) assisted by UNDP, another project assisted by UNDP in preparation (GEF5) and Kokoda Initiative assisted by Australian Government have the common objective with the Project such as establishment of NPAS, though the approaches are different from each other.

－Whether any other donor has already started a similar project in the target area or not.

No, it hasn't at least for Varirata National Park.

－*Presence/absence of cooperation results or plans by third-countries or international agencies for similar projects.*

As stated above.

－*In the case that a project was conducted in the same field in the past, describe the grounds for requesting this project/study, the present status of the previous project, and the situation regarding the technology transfer.*

There has been no similar project at least for management of Varirata National Park.

－*Whether there are existing projects/studies regarding this requested project/ study or not. (Enter the time/period, content and concerned agencies of the existing studies.))*

JICA implemented the Information Collecting Study on Biodiversity Conservation in Papua New Guinea from April to June 2013.

(3) Other relevant Activities (Activities in the sector by the recipient government and NGOs), if any:

- Coral Triangle Initiative (CTI) lead by DEC
- PNG Forest Authority is currently implementing "Capacity Development on Forest Resource Monitoring for Addressing Climate Change in Papua New Guinea" (from March 2011 to March 2014) with technical assistance from JICA.
- UNREDD project assisted by EU and FAO
- Lowering Emission of Asian Forests (LEAF) assisted by USAID
- Community Climate Change and Adaptation Program (CCAP) assisted by USAID
- UPNG is implementing "Mangrove Rehabilitation for Sustainably Management Healthy Forest Project (MARSH)" with assistance of USAID, IUCN and Wildlife Conservation Society.

(4) Other relevant information(Available data, information, documents, maps, etc. related to the Project)

Not in particular.

11. Global Issues *(Gender, Poverty, Climate change, etc.)*

(Any relevant information of the project from global issues (gender, poverty, climate change, etc.) perspective.)

Biodiversity conservation itself is one of the Global Issues.

12. Environmental and Social Considerations

(In case of Technical Cooperation Project / Technical Cooperation for Development Planning, please fill in the attached screening format.)

(Note) If JICA considers that the environmental and social considerations are required to the T/C, the applicants agree on JICA's information disclosure of the T/C for public hearing in accordance with JICA guidelines for environmental and social considerations as stated Question 11 in attached Screening Format.

13. Others

Signed:_____

Title: _____

On behalf of the Government of _____

Date:_____

Additional Form for Expert

※If the applicants select the Individual Expert in 4. , please fill out this form.

1. Type of Assignment

(New / Extension / Successor)

If this type is “Extesion” or “Successor”, please show whose extension or successor it is.

2. Qualifications and Experience required

(1) Age Limit

(2) Educational Background

(Doctor / Master / Bachelor)

(3) Practical Experience on Related Field

(4) Language

(Name / Level)

(5) Other Qualification and Experience

Additional Form for Equipment

※If the applicants select the Individual Equipment in 4. , please fill out this form.

1. Estimated Cost for the Equipment

☐Recipient Country / ☐Japan / ☐Third Country

2. Place of Procurement

3. Preferable Time of Delivery

4. Necessity of Dispatch of Expert/s for Installation and Adjustment of the Equipment

☐Necessary / ☐Not necessary / ☐Not clear

5. Main Users of the Equipment

6. List of the Equipment Requested

(Name of equipment)	(Specification)	(Quantity)	(Cost)
(1)			
(2)			
(3)			

Screening Format（Environmental and Social Considerations）

Please write “to be advised (TBA)” when the details of a project are yet to be determined.

Question 1: Address of project site

- Varirata National Park and its surrounding area in Hiri District, Central Province
- Other target protected area(s) (to be determined)

Question 2: Scale and contents of the project (approximate area, facilities area, production, electricity generated, etc.)

2-1. Project profile (scale and contents)

Varirata National Park was gazette in 1969 even before the independence of PNG. It is considered as the oldest national park in PNG (DEC 2013). Its whole are (1,063ha) is located in Central Province and its in proximity (about 40minutes in the car) of the national capital, Port Moresby. The park area nearby the entrance used to be garden and/or logged for sawmilling then open secondary forest is observed. The untouched forest in the middle of the park shows characteristics of forest in tropical monsoon which is unique as in the area. Along the trail, there is a chance to observe bird of paradise (Paradisaea apoda), cookatoo (Cacatua sp.), Brush-turky, etc. Currently, approx. 20 visitors per week enter the national park. There is one ranger posted by DEC in the park. Some of recreational facilities (huts, shelters, roads, camping sites) were damaged or aged. There is no management plan for the Park, while some government agencies are now discussing its management especially that for tourism development. DEC is conducting initial scoping in tourism development. DEC conducted scoping analysis varirata park, which includes tourism development of the Park together with some other attraction around it.

2-2. How was the necessity of the project confirmed?

Is the project consistent with the higher program/policy?

☑YES: Please describe the higher program/policy.

（National Biodiversity Strategy and Action Plan (NBSAP), National Protected Area System Policy (NPAS, in discussion)）

□NO

2-3. Did the proponent consider alternatives before this request?

☑YES: Please describe outline of the alternatives

（We have considered and are considering targeting other protected areas.）

□NO

2-4. Did the proponent implement meetings with the related stakeholders before this request?

□Implemented ☑Not implemented

If implemented, please mark the following stakeholders.

□Administrative body

□Local residents

□NGO

□Others（ ）

Question 3:

Is the project a new one or an ongoing one? In the case of an ongoing project, have you received strong complaints or other comments from local residents?

☑New ☐Ongoing (with complaints) ☐Ongoing (without complaints)

☐Other （ ）

Question 4:

Is an Environmental Impact Assessment (EIA), including an Initial Environmental Examination (IEE) is, required for the project according to a law or guidelines of a host country? If yes, is EIA implemented or planned? If necessary, please fill in the reason why EIA is required.

☐Necessity (□Implemented □Ongoing/planning)

(Reason why EIA is required:)

☑Not necessary

☐Other (please explain)

Question 5:

In the case that steps were taken for an EIA, was the EIA approved by the relevant laws of the host country? If yes, please note the date of approval and the competent authority.

☐Approved without a supplementary condition	☐Approved with a supplementary condition	☐Under appraisal

(Date of approval: Competent authority:)

☐Under implementation

☐Appraisal process not yet started

☐Other ( )

Question 6:

If the project requires a certificate regarding the environment and society other than an EIA, please indicate the title of said certificate. Was it approved?

☐Already certified

Title of the certificate: ( )

☐Requires a certificate but not yet approved

☐Not required

☑Other (Nomination of Varirata National Park and its surrounding area as Biosphere Reserve under UNESCO's Man and Biosphere Programme (MAB) requires consent of representatives of local communities in advance.)

Question 7:

Are any of the following areas present either inside or surrounding the project site?

☑Yes ☐No

If yes, please mark the corresponding items.

- ☑National parks, protection areas designated by the government (coastline, wetlands, reserved area for ethnic or indigenous people, cultural heritage)
- ☑Primeval forests, tropical natural forests
- ☑Ecologically important habitats (coral reefs, mangrove wetlands, tidal flats, etc.)
- ☑Habitats of endangered species for which protection is required under local laws and/or international treaties
- ☐Areas that run the risk of a large scale increase in soil salinity or soil erosion
- ☐Remarkable desertification areas
- ☐Areas with special values from an archaeological, historical, and/or cultural points of view
- ☑Habitats of minorities, indigenous people, or nomadic people with a traditional lifestyle, or areas with special social value

Question 8:

Does the project include any of the following items?

☐Yes ☑No

If yes, please mark the appropriate items.

☐Involuntary resettlement (scale: households persons)

☐Groundwater pumping (scale: m3/year)
☐Land reclamation, land development, and/or land-clearing (scale: hectors)
☐Logging (scale: hectors)

Question 9:

Please mark related environmental and social impacts, and describe their outlines.

☑Air pollution
☑Water pollution
☐Soil pollution
☐Waste
☐Noise and vibrations
☐Ground subsidence
☐Offensive odors
☐Geographical features
☐Bottom sediment
☑Biota and ecosystems
☐Water usage
☐Accidents
☑Global warming

☐Involuntary resettlement
☑Local economies, such as employment, livelihood, etc.
☑Land use and utilization of local resources
☑Social institutions such as social infrastructure and local decision-making institutions
☑Existing social infrastructures and services
☑Poor, indigenous, or ethnic people
☐Misdistribution of benefits and damages
☑Local conflicts of interest
☐Gender
☐Children's rights
☐Cultural heritage
☐Infectious diseases such as HIV/AIDS
☐Other ( )

Outline of related impact:

Positive impacts on the all the ticked items above are expected.

Question 10:

In the case of a loan project such as a two-step loan or a sector loan, can sub-projects be specified at the present time?

☐Yes ☑No

Question 11:

Regarding information disclosure and meetings with stakeholders, if JICA's environmental and social considerations are required, does the proponent agree to information disclosure and meetings with stakeholders through these guidelines?

☑Yes ☐No