Papua New Guinea's

Fifth National Report

to the

Convention on Biological Diversity

September 2014

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Executive Summary

Biodiversity

Papua New Guinea is a high biodiversity country in both the terrestrial and marine environments. Many new species of many different genera of plants and animals are still being 'uncovered' through ongoing and concentrated efforts by various researchers and institutions, incrementally filling in the gaps of our knowledge. Areas that were blank on the Conservation Needs Assessment map of 1994 have been filled in over the last 20 years, although many areas are yet to be surveyed.

Of the known biodiversity little is known of the natural history requirements of species or the tipping points of the mosaic of ecosystems that make up Papua New Guinea. Many of the species are unique endemics such as the orchids, birds of paradise, tree kangaroos, mangroves and reefs, while others are migrants along flyways or migratory paths such as birds, tuna, marine turtles and cetaceans.

Of all known biodiversity few species are well enough known to be evaluated on the IUCN red list of threatened species. These biodiversity unknowns therefore influence our ability to determine the amount and rate of change of our biodiversity and the habitats and niches that they depend upon. Much of this knowledge lies with the people who live within and depend upon the environment for their livelihood and wellbeing.

Management

The custodianship of the environment for much of PNG lies with the landowners and those with user rights. How this is effected is very much a mosaic of preservation, sustainable use, exploitation and degradation, spatially and/or temporally. For areas of the highlands agriculture has been practiced continually for over 8,000 years defining an anthropogenic landscape whilst many coastal areas have been inhabited for 3,000 years or less. Over these many generations localised environmental use and management has evolved to what it is today with all its dynamic influences.

Ministry

Within Papua New Guinea the National Government Ministry for Environment & Conservation and Climate Change heads the two core Departments that oversea the implementation of the Convention on Biodiversity, UNCBD. The primary role is led by the Department of Conservation DEC which is in the process of transitioning to a Conservation and Environment Protection Agency CEPA by 2015 and a secondary role by the Office of Climate Change and Development OCCD, whose primary role is the implementation of the UNFCCC.

DEC transitioning to CEPA

Within this reporting period there has been considerable dynamic change both in government and in the restructuring of the Department of Environment and Conservation and Office of Environment Climate Change and Development.

This period has been one of consolidation and until this is fully effected with CEPA along with the national government's endorsement of policy such as the *Policy on Protected Areas 2014* the subsequent review of *NBSAP* and its implementation along with those of the *Aichi Targets* and *Millennium Development Goal on Environment* will follow.

National Government Development Plans

In 2010 the government set out a long term development plan for the country called *Vision 2050* which sets out an outline to achieve the aspirations of the goals of the *National Constitution 1975*. This did plan did not gain traction until the formation of the 9th National parliament in 2012 where the members who formed government agreed upon the *Alotau Accord,* which embraces the *National Plan 2030* and the *Vision 2050* in its five-year plan. Pillar 5 within the *Vision 2050* is *Environmental Sustainability and Climate Change*.

A development paradigm shift towards green development was also set out by the Department of National Planning and Monitoring with the *National Strategy for Responsible Sustainable Development for Papua New Guinea. The Strategy 2014*. When implemented this will be a positive shift towards future implementation of the CBD.

Policy

From these planning initiatives a series of policy developments took place during this reporting period. There has been a long consultative process in the development of policy, which is to direct, and be implemented by government line agencies.

These policies that relate to the environment and biodiversity, that will, when implemented have influence on the management of ecosystems and the species they contain. They are the *National Climate Compatible Development Management Policy 2014*, the *National Sustainable Land Use Policy 2014* and the *Policy on Protected Areas 2014*. These have filled long outstanding policy gaps and will guide future initiatives in mainstreaming sustainable biodiversity management and conservation across different sectors and as precursors to supporting legal reform. They will also help to mesh together the efforts of different National departments in future sustainable development by factoring in environment and biodiversity concerns.

Law review

Within this process it has also been recognised that national government legislation needs to be reviewed and wherever possible harmonised so that land use planning factors in and trades off, different land use options.

In 2014 the *Conservation Environment Protection Act 2014* was drafted, and the *Forestry Act 1991* and *Mining Act 1992* were discussed for the consideration of amendments. In the later the discussions relating to the system of riverine and deep-sea tailings disposal and deep-sea mining were raised and amendments in relation to these are still under consideration. The *National Cultural Property (Preservation) Act 1965* also is under revision led by the PNG National Museum and Art Gallery.

The year 2014 has therefore seen a broad mainstreaming of sustainable development planning that factors in environmental concerns across the sectors of Planning, Land Use, Forestry, Mining, Climate change and Environment.

CEPA

In response to the countries' development plans set out in the *Vision 2050* and projected strong economic growth the Department of Environment and Conservation is currently transitioning to a Conservation and Environment Protection Agency. It would maintain essential conservation functions but take on a greater role in regulatory functions. Notably the approval of environmental impact assessment of proposed development projects as per current legislation followed by the issuance of environmental permits and ongoing reporting and compliance of any major developments, environment plan.

As an agency it will be supported financially through annual National budget allocation, however sustainable financing of its operations will be received through the issuance of permits, the advancement of thinking on payments for ecosystem services and biodiversity offset derived from major development projects.

PNG NBSAP

As a result of all this dynamic policy, legislative and institutional change the *PNG NBSAP 2007* has been maintained pending these changes and has not as yet been amended from this first version. Many of the Development Plans and policies mentioned have taken on aspects of implementing the *NBSAP* and the objectives set out in the *Aichi targets* and *Objective 7* of the *Millennium Development Goals.* It is anticipated that the *NBSAP* will be reviewed in 2015 with this report being the basis of an informed evaluation of progress to date.

Strategic conservation planning has advanced with the initiation of a Marine Plan of Work Protected Areas (PoWPA) analysis across PNG's EEZ which is inclusive of both nearshore and deep sea ecosystems. It is anticipated that this will be combined with a review of the existing Terrestrial PoWPA leading to a complete overarching conservation planning framework from the mountain ridges to coast, to reef to deep sea, taking into account how these interact with each other, for the first time in a unified plan. It is hoped that this will play a major part in also having a more strategic approach in conservation planning and implementation of initiatives, which has been missing up to this point.

Apart from the above policy and planning initiatives the sections of the *NBSAP* that have been well implemented are in capacity building, in collaboration and development of partnerships with government agencies, industry, NGOs, communities and donor agencies. This has led to a diversity of funded initiatives in advancing the NBSAP, however this has not always led to major advances in conserving biodiversity. The development threats to biodiversity have increased at a rate greater than PNG's ability to overcome them.

Threats to Biodiversity

Papua New Guinea biodiversity continues to face growing threats from a wide range of activities, including illegal and/or unsustainable logging, subsistence exploitation, monoculture palm oil, commercial mining, road construction, invasive and/or exotic species and unsustainable fisheries. These environmental threats are exacerbated by global climate change and increasing weather variability, which is increasing the incidence of fires within forests and savannas, flood events, erosion, and seawater incursion into coastal regions.

The primary threats to terrestrial biodiversity in PNG are deforestation and degradation (from logging and subsistence agriculture), mining (including pollution and waste runoff) and agricultural conversion (for oil palm). The main drivers of deforestation and degradation in PNG are logging (48.2%) and subsistence agriculture (gardening) (45.6%). Not only are forests impacted directly from these activities, but the secondary effects from improved road access makes previously inaccessible areas susceptible to ongoing clearing for agriculture and salvage logging. Recent spatial analysis suggested that the average annual rate of deforestation and degradation across all regions of PNG over the 1972-2002 period was 1.4%, almost twice the rate previously recorded. Current rates will become available with the *State of Forests* report from the PNG Forest Authority possibly later in 2014.
It is estimated that by the date of current *Aichi Targets* 2020, 83% of the commercially accessible forest areas will have been cleared or degraded if current trends continue. Much of the logging-related forest loss is concentrated in lowland forest areas; by 2002, lowland forests accessible to mechanized logging were being degraded or cleared at the rate of 2.6% annually. In particular, the islands region (New Britain and New Ireland) have been subject to intense logging activity; the majority (63%) of the 2.8 million ha of accessible lowland forests in these areas had been deforested or degraded by this date. Logging was initially focused in the islands region because of ease of access, fertile soils and good quality forest, more recently this region has been the centre of intensive oil palm plantation development.

The growth of subsistence agriculture is a pervasive threat to forest areas, linked closely to the high population growth (rural 2.3-2.6%), but this also reflects the needs of communities to develop increased cash crops in response to modern cash driven economic pressures. With almost all remaining forest areas in the hands of communities, clearance and conversion for subsistence agriculture continues to be a strong underlying driver for forest loss. Along with the subsequent loss of associated biodiversity, with the added pressures of fauna loss from hunting in areas proximal to settlements, agriculture or access routes.

Large-scale mining for minerals such as gold and copper have resulted in both direct impacts from forest clearing (including for infrastructure, access roads and associated support) as well as sometimes-extensive indirect impacts from pollution and runoff of tailings. The best-known example of this is from the Ok Tedi gold and copper mine in the Western Province, where contamination from tailings discharge have damaged at least between 250,000 - 150,000 ha of forest in the lower Fly River catchment and discharge reaching the Torres Strait

of Australia. Other important river systems, such as the Strickland have also been impacted by sedimentation and pollution, while a gold mining lease in the Brown River catchment was disallowed in 2008 due to concerns on potential impacts on the water supply for PNG's capital, Port Moresby.

Agricultural conversion has not yet had an extensive impact on forest areas compared with logging, however, the pace of conversion is increasing, driven partly by recent price rises for agricultural commodities, and demand for palm oil. The issuance and subsequent commission of enquiry into Special Agricultural Business Leases (SABLs) which accumulated 12% of the country from 2003 to 2011 as land clearance under the guise of oil palm. From recent assessments it is estimated that five plantations totaling 180,000 ha might be developed in the foreseeable future.

Other pressures on forest ecosystems include subsistence harvesting of non-timber forest products (eaglewood resin) and hunting and fishing. Subsistence harvesting was generally linked to the need for cash, while hunting and artisanal fishing are generally for personal consumption or local sale. The national government has supported a free education policy since 2011 and free health care delivery since 2014 taking this burden off of the rural communities to use their environmental capital to develop their social capital. Traditional hunting is the major threat to mammals such as the now endangered Tree Kangaroos often putting localized pressure on fauna. The need for cash and food protein are pressures that are closely correlated with population growth.

There is a low level of poaching with incidences discovered by Customs agents and National Agriculture Quarantine Inspection Agency (NAQIA) officers in border control. No highly organized poaching racket has been found at this stage.

Changes in Biodiversity status

Without a solid baseline and ongoing monitoring the current status and trends of many components of biodiversity under the threats outlined are not known for Papua New Guinea. The perception of local communities is therefore often the basis of reporting trends. It is also anticipated that with increasing threat there is also increasing impact upon different species, their habitat and associated ecosystems and this is a precautionary principle status in the absence of scientific data.

Despite this generally accepted trend however there are initiatives that are occurring which have had a positive impact on biodiversity. There are site, species and ecosystem initiatives in sustainable use and conservation through bilateral support, the programs of NGO partners and by industry, in country. There are two flagship Tree Kangaroo projects, which have improved the security and status of species in two separate areas of the country. A process that has taken well over a decade of dedicated effort to achieve. The Coral Triangle Initiative enabled extensive conservation efforts across the countries' near-shore environment, which has led to the establishment of Locally Managed Marine Areas that whilst managing the environment, maintain communities food security. The regulating of export of CITES II species has

maintained a controlled exploitation of listed species. Papua New Guinea's crocodile populations and exports have been maintained through sound management through this regulatory mechanism.

The *Nauru Accord* has put in place codes of practice, mechanisms and an observer program that if followed will maintain a sustainable tuna fishery across its range which includes Papua New Guinea waters. Recently however in 2014 the European Union gave PNG a 'yellow' card in regards to compliance within the tuna industry.

There are other developments from within other fisheries, forestry, mining and waste management, that also could be considered for a 'yellow' card from lack of compliance or adherence to best practice.

But as mentioned the extent and impact of increasing population, the majority of which rely directly upon the environment and a developing economy has been greater than the efforts to maintain biodiversity in a sustainable future.
Due to a lack of strategic direction, the protracted process of policy development and transitioning of the lead agency of the Department of Environment and Conservation to an authority, progress towards achieving our commitment to the *Aichi* and *MDG 7* targets has not been on track. There is now even more an urgent need to build upon our successes and get back on track.

Getting back on track
Despite the past challenges PNG and its government agencies are now better placed to move forward and get our targets on biodiversity within *Aichi* and *MDG 7* back on track, if done through support of a coordinated effort. The following are an overview of some of the suggested actions to get back on track.

NBSAP revision linked to sustainable development paradigm
The first action is to revise the *PNG NBSAP 2007* taking into account the changes in policy and the current state of implementation, ensuring that these are considered and linked to the Aichi and MDG targets and the countries' new direction under the *Sustainable Development Strategy 2014*.

The revised *NBSAP*, the *Policy on Protected Areas 2014* to then be implemented by the Department of Environment and Conservation and socialised with other line departments and government agencies for inclusion in their work plans.

Governance
Laws that relate to biodiversity and the environment need to be reviewed and harmonised wherever possible such that they reinforce and compliment each other.

Data

The current Species Information Management System (SIMS) database housed within DEC to be upgraded to a database that has sections that are publically available and user friendly and others, which are secure for internal use only. This database is to be linked to others within the country and to databases outside the country that contain information on PNG biodiversity wherever possible. Having a biodiversity database in place will inform the department in planning, directed implementation of initiatives and evaluation of development and compliance.

A Spatial Conservation Planning Blueprint

The Terrestrial and Marine PoWPA evaluations to be combined into a single Papua New Guinea Conservation Priorities Planning Map with supporting data layers. This will be supported through an outline of the process followed and a defined logic of decisions made including *Aichi* area based targets. This process to be refined by DEC on a regular basis with new information and broadened to include the customary and social values of biodiversity.

Ecosystem Services Development

An assessment of ecosystem services across the country and their value/replacement value to be researched. These ecosystem services to then be linked to human wellbeing and or poverty reduction. An example being the provisioning services of fresh water and its relative importance to domestic water use or hydropower that can be determined in a multivariate analysis. Another example is the provisioning, regulating and cultural services of the rainforest through the development of REDD+ pilot studies.

Valuing Environmental/Ecosystem Services in Local and National Accounting

The value of environmental/ecosystem services needs to be incorporated into National Accounting. In this way the costs of changes in the environment can be considered to inform development plans and any associated permits or offset requirements. In this way the costs of development that impact upon the environment can be recognised and recompensed. Also there is a policy gap on the payment for ecosystem services that needs to be addressed. This would also determine legislative requirements and the outline of a mechanism to achieve PES.

Biodiversity Offset

Biodiversity Offset to become a future best practice to offset impact from development projects. This needs to be formalized by the government to facilitate conservation of biodiversity and ecosystems that are affected by development. The experiences gained by the PNG LNG Biodiversity Offset can be used to inform this process.

Investing income from resource extraction in responsible development

The PNG LNG project is a game changer for the country and the economic growth that it drives along with other current and future resource extraction projects must also fund activities to implement the new responsible development strategy that lead to sustainable ecological and biodiversity

management. This will require political will, a clear implementation plan and a fully resourced and capable agency to lead a collaborative effort of implementation in partnership with all stakeholders.

Mainstreaming Conservation

Reaching all areas of the country with 'on site' environmental initiatives has been shown to be complex. With the current rates of environmental change we will run out of time and money to achieve conservation through this method alone. Innovation through use of audio-visual and interactive materials on conservation issues for education, awareness and advocacy needs to be developed.

The foremost and most effective action conservationists can take now to mitigate the coming crisis is to prepare the national conservation communities so they are more capable to deal with the unknowns ahead.

Part I Biodiversity status, trends and threats and implications for human well-being

1 *Biodiversity importance in PNG*

1.1 Human well-being

Papua New Guinea has a diversity of cultures of its peoples who are linked to the 800+ living languages which are spoken. These languages and traditions of each community and of each culture, are strongly influenced by the local environment, its ecosystems and species. Each language and culture is both shaped by the environment and describes it. Peoples' identity and customs are linked to the place from where they come from and/or by where they live. The natural environment therefore has a strong influence on the majority of Papua New Guineans who live within and rely upon it to maintain their way of life and standard of living.

Papua New Guinea is still a duel economy with 80% of Papua New Guinea's population placed within subsistence farming communities who are reliant on the productivity of their environment. They rely upon the provisioning services of food, water, fuel, materials and medicines, regulating services of climate and water, cultural services of sense of place and supporting services such as soil formation. Although many rural communities are cash poor they are rich in environmental capital. Many use this environmental capital to support the development of their social capital. However with a *National Free Education Policy* in place since 2011 and free health care delivery from 2014 this has helped to take pressure off of exploitation of the natural environment previously used to generate income to pay for these social services. Nonetheless environmental capital, both natural and agricultural is a major driver of socio-economic status of rural Papua New Guinea

The cash sector is the other element of the duel economy. This is dominated and driven by the mining sector and from 2014 with production from the PNG LNG project this sector will become even more dominant for the current generation. The renewable resources sector remains significant and generates income across much of the country through agriculture which is predominantly the export of raw products, along with forestry, a large proportion of which is round log export.

Urban drift also puts pressure on the import of goods and services to support the towns and also in waste management and disposal. The provision of water, food and energy to large towns is a developing issue. Again there is dualism in the major centres, such as the capital Port Moresby and Lae, which have greater than 40% of the population living in squatter settlements. Traditional knowledge and links to the natural environment also tend to be eroded with town living and some peoples are becoming detached from their traditional lands.

1.2 Socio-economic development

Livelihood

As the majority of Papua New Guinean's rely on the environment for their livelihood they inherently value it. However when major developments are proposed that will impact upon the environment, the prospect of cash in many instances is seen as a better option without weighing up the environmental costs. This is because many communities are in cash poverty, but rich in environmental capital. Determining the cost and benefits of development is not easy, as knowing the value of the environment or what is a fair payment for ecosystem services is not well researched in Papua New Guinea.

There are many benefits from the environment an its intact biodiversity, some traditional and some through its commercialisation.

Medicine

Medicines derived from both the terrestrial and marine environment by local communities along with knowledge of these, is either commonly shared or is known by a select few. These are used mainly in their raw form, with some sold in local markets. There has been some eco-botanical work done in PNG that has been published and some bio-prospecting which led to debate on intellectual property rights. Although no major pharmaceutical company has developed any commercial drug from local species this remains a potential prospect.

Tourism

Tourism is at low levels in PNG despite the generally unspoilt environment and cultural dimension that is found in here. This is due to many factors such as the high costs of air travel around the country and accommodation. The two major tourism packages that relate to the environment are, the trekking of the *Kokoda Track* which also has a WW2 history and dive tourism. There is also expeditionary tourism on live-aboard vessels of the coastal environment and the Sepik River, whilst there are more informal travellers on private yachts that sail through different destinations. There are also select birding groups that target endemic species. Of these the Kokoda Track has led to a major conservation initiative that is outlined further in this report. Game fishing of both estuarine and marine species is a niche market.

There are opportunities for eco-tourism as many local people have strong cultural ties to their natural environment that is an experience that many tourists are attracted to.

Cultural Enterprise

Cultural enterprise is evident across the many cultural shows that occur around the country. This is a development where customary regalia and items/inspiration that come from the environment are brought into dances and cultural shows in urban centres. This is often with the combined intent of maintaining culture and developing a tourism event to generate income. Other

enterprise is the production of an array of artefacts created from products from the environment and art works.

Ecosystem Services REDD+

The payment for ecosystem service, which is the most advanced in PNG is the current research into REDD+ with the Office of Climate Change and Development (OCCD) earlier known as the Office of Climate Change and Carbon Trade (OCCCT 2009). Many of the forest types and some tree species across PNG have been evaluated for carbon storage through the work of the Forest Research Institute, PNG Forest Authority and NGOs. This is an ongoing program of research. PNG has not however yet set up a law, defining policy or mechanism to trade in carbon credits in a compliance market. In association with this work the OCCD has calculated the GHG emissions and footprint by sectors within PNG.

Ecosystem Services Water catchment

Much of the electricity of PNG is generated from hydropower from two major dams on either side of the country. These are the 62MW Rouna in Central province and the 77MW Yonki in the Eastern Highlands. The watershed management of these catchments is ongoing. In 2010 a feasibility study was initiated by PNG Power for the 80MW Naoro-Brown River hydro scheme and research on the socio-environmental context of this catchment is ongoing. The proposed 2,500MW Puarari Delta project that was to generate power for PNG and Australia was again put on hold in 2014. Around the country there are also other small local hydroelectricity generation plants that have a small ecological footprint. The ecosystem service value of maintaining the catchments that support these dams has not been determined.

1.3 Biodiversity and ecosystems of PNG

Papua New Guinea is made up of the Eastern Sector of the Island of New Guinea and also the western portion of the extensive Bismarck Island chain that extends from Manus in the north through the Solomon Islands and Vanuatu. In the south it is geologically a part of the Australian craton however the uplifted central ranges and northern aspect consist of a group of aggregated raft of islands that has resulted in a mosaic of endemic biodiversity across what is the island of New Guinea. Whilst the Bismarck Islands are essentially a present day island raft on the North and South Bismarck Plates. The Island of New Britain especially is volcanically quite active. Also the Solomon Sea and Woodlark plates are dynamic, the latter undergoing sea floor spreading (see Figure 1).

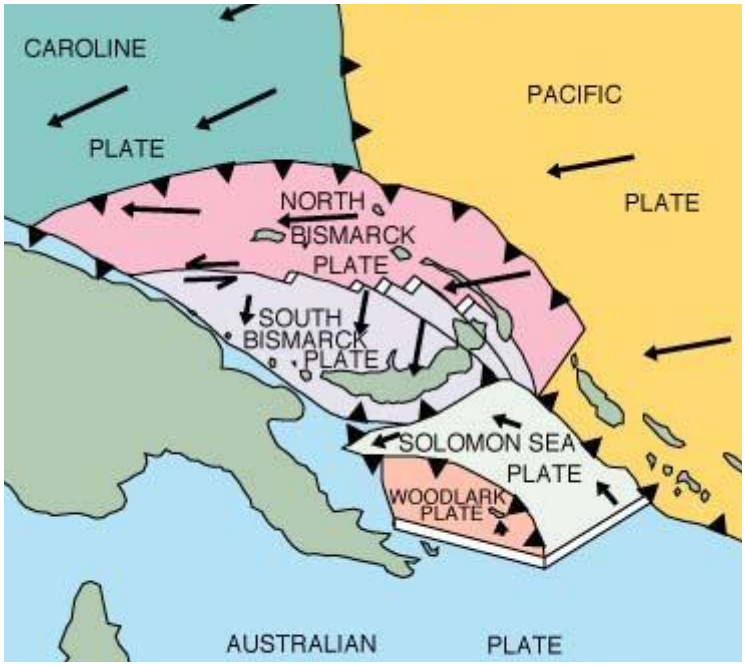


Figure 1. Tectonic Plates which have influenced the formation and biodiversity of PNG.

Many of the central mountain peaks were glaciated or snow covered in the last ice age and the evolution of many endemic species has taken place within these isolated islands and mountains. Over recent history since this period much of the land mass of Papua New Guinea has been covered by rainforest dominated plant communities.

1.3.1 Terrestrial Biodiversity

The rainforests of Papua New Guinea are East Malesian with a combination of Asian and Australian elements. The lowland rainforest is floristically rich, especially of tree species with 80 genera and upward of 1200 species with some of its forests equivalent to the richest rainforest of Kalimantan and peninsula Malaysia to the west.

Papua New Guinea has over 3,000 species of orchids, which is over 10% of the currently known world species.

Papua New Guinea is a centre of endemism of mangrove communities with at least 37 species that make up coastal fringing mangrove forest ecosystems (see Figure 2). These support spawning and nursery grounds for many marine species.

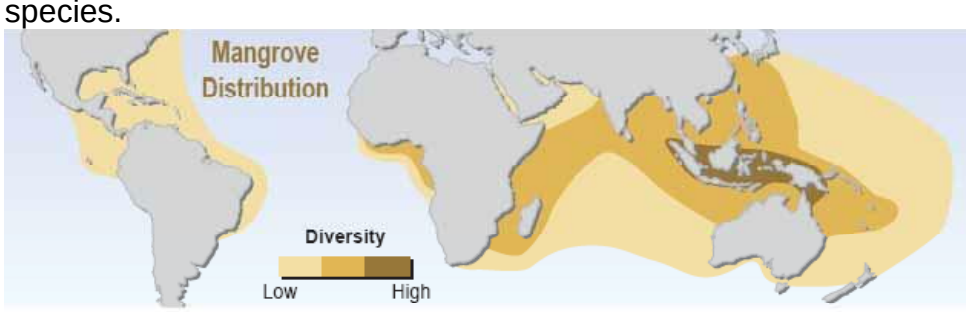


Figure 2. Mangrove species richness

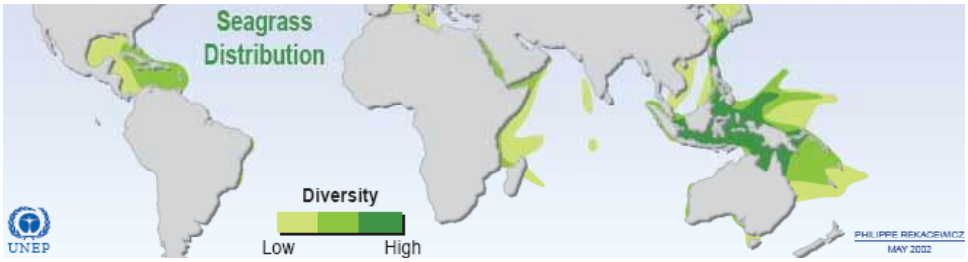


Figure 3. Seagrass species richness

New Guinea is the centre of endemism for sugar cane and bananas and therefore has important genetic stock for future plant breeding of these food crops. There is also evidence of continuous agricultural cultivation over the last 8000 years at Kuk in the highlands. This is currently the only UNESCO World Heritage listed site within the country and is of cultural significance.

The Mammals occurring in Papua New Guinea of which almost 200 are endemic, are rich in marsupials and rodents. The tree kangaroos *Dendrolagus* are a major group with 60 percent found in Papua New Guinea. The skins of some tree-kangaroos are used by some groups within PNG as a part of customary ceremonial dress. Five species are unique to PNG and a further 2 are shared with Indonesia of the currently recognised 12 species. Another genetically distinct endemic is the long beaked echidna *Zaglossus* of which two of the three species are shared between PNG and Indonesian New Guinea. Many of the mammal species are a protein source for the local people of PNG.

Of the Birds of Paradise 86 percent are found in Papua New Guinea. Ten species of the Birds of Paradise are unique to PNG and a further 20 are shared with Indonesian New Guinea and a further 2 species shared with Indonesia and Australia of the currently recognised 39 species. The plumes of many birds of paradise area an important part of customary head-dress of many cultures used for traditional cultural events.

PNG is quite rich in Papillionidae and Pieridae Butterflies with 40 and 146 species respectively.

1.3.2 Marine

The marine biodiversity in Papua New Guinea of corals, reef fish and molluscs is among the highest species richness in the Coral Triangle and is therefore of global importance. There are 430+ species of corals (see Figure 4). There are near 1000 species of molluscs and 1100+ reef fish species (see Figure 5). Papua New Guinea therefore has some of the highest biodiversity richness in the world.

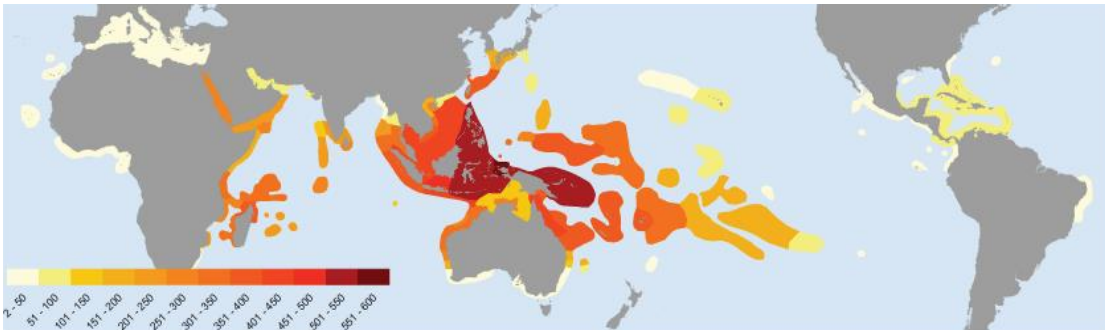


Figure 4. Global Species Richness of zooxanthellate corals.

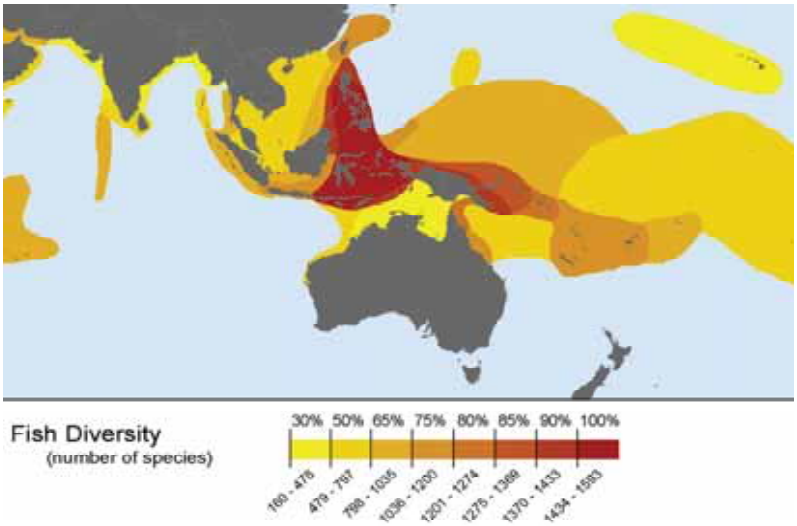


Figure 5. Fish Diversity

2 Major changes in the status and trends of biodiversity in PNG

2.1 Biodiversity Status

In Papua New Guinea there are many areas of the country that remain unsurveyed for biodiversity. Though many gaps have been surveyed spatially in the last 20 years since the Conservation Needs Assessment there remain many areas unsurveyed (see Figure 6).

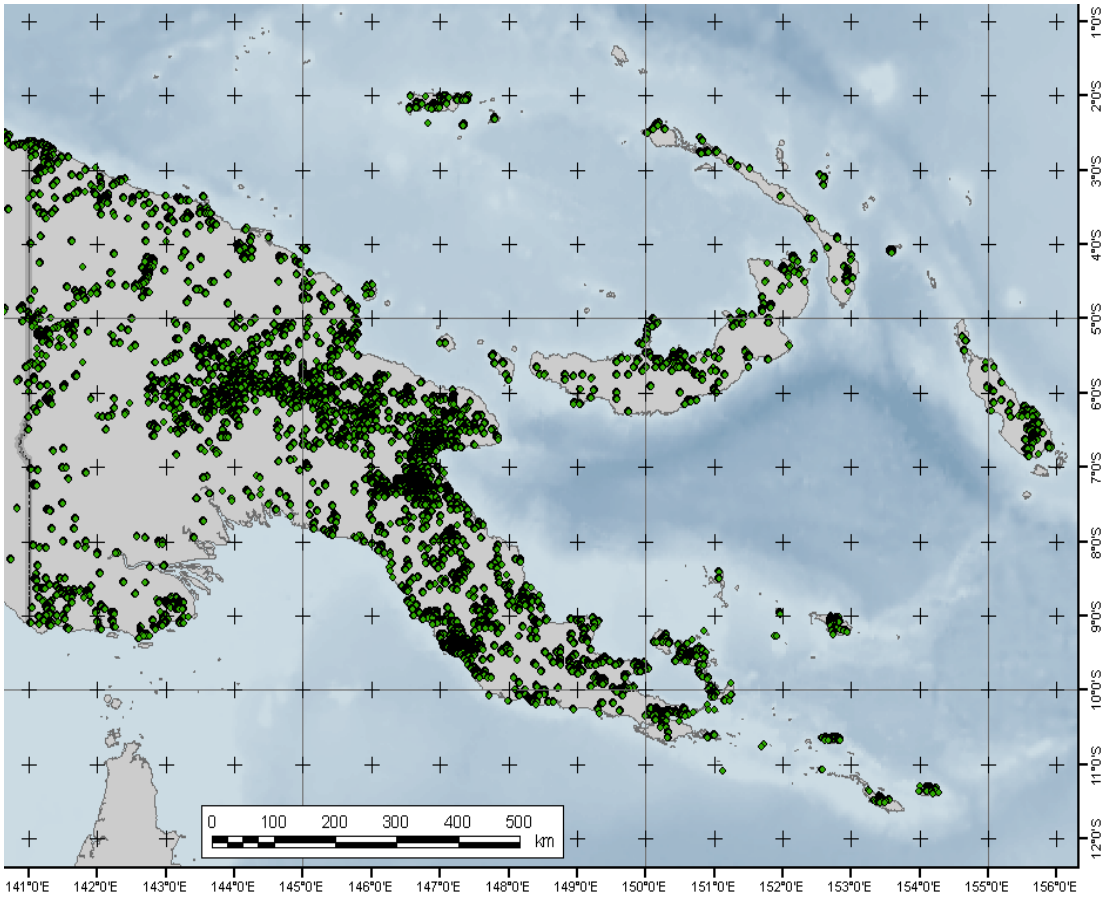


Figure 6. All survey and *ad hoc* locations based on compiled taxa records with acceptable spatial accuracy

There are also areas surveyed but only for limited taxa. What biodiversity is found is also often dependent upon the time of year and weather during collection

This is a major issue in relation to the reporting of the status and trends of biodiversity for Papua New Guinea.

Much of the biodiversity effort in PNG is still in biodiversity surveys including the identification of new species and new range extensions. As a case in point (see Figure 7), where in the decade from 1995 to 2005 the number of known frog species in PNG increased by nearly 100% from 200 described species to near 370 described species. It is still anticipated that with increased survey effort of both previously surveyed areas and new unsurveyed areas more new species will continue to be found (see Figure 8). It is not yet near asymptote. It is difficult to report species population trends when new species are being found of which very little natural history is known or the range and total population is an estimate. Most species records are just siting recordings.

170 New species of frog found 1995-2005

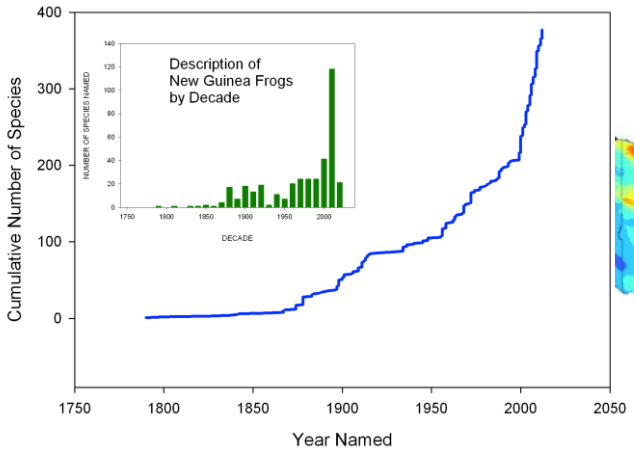


Figure 7. Cumulative description of new frogs

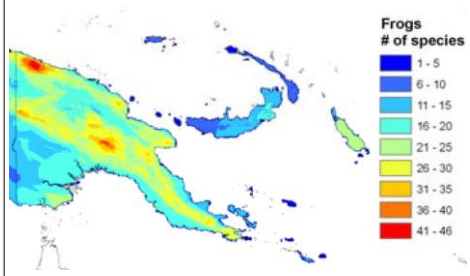


Figure 8. Species richness of frogs

This situation also applies to many other taxa in varying amount. Evidence from recent camera trapping surveys of previously unsurveyed areas of the Hindenburg Wall 2013, P'nyang Karst 2013 and the Torricelli Mountains 2014 is that there are new mammal species, many nocturnal which are yet to be captured and confirmed if they are new species.

Although many mammal species have been named, there are few for which the natural history is well known and for which the effective and total populations are known. Even less have been monitored over time to reveal trends in population. This is compounded by the often inaccessible and rugged terrain and scattered distributions of many species. The Global Mammal Assessment has assigned IUCN categories to most mammals however the status often changes with improved species information rather than a reasoned change over time.

Through well directed discussions with hunters their views on hunted species spatial and temporal trends over time can be collected. Often they will hold views that will explain these trends. Within PNG there is no formally organised citizen science collection to bridge the knowledge gap we have on the vast number of species found in Papua New Guinea.

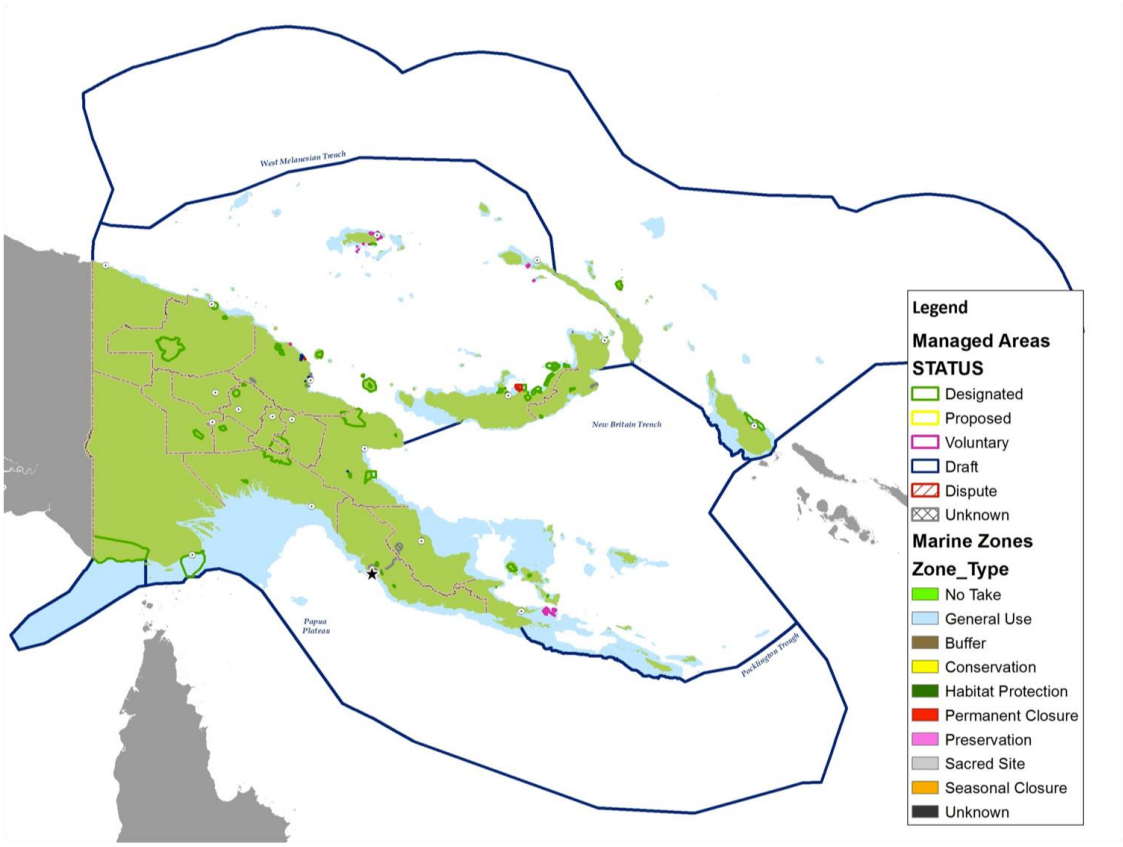


Figure 9. Protected/Managed Areas Terrestrial and Marine

2.1.1 Protected Areas Status

Within Papua New Guinea the number of Terrestrial Protected areas remains the same with the gazettal of proposed new Wildlife Management Areas WMAs on hold pending the transition of DEC to CEPA and the approval by cabinet of the *Policy on Protected Areas 2014* to direct the way forward in the protected area system. Within the policy there is indication that using the information from the Terrestrial and now Marine PoWPA along with field assessment, the current status and effectiveness of the current protected area network for conserving biodiversity will be evaluated.

Also from the work of the Coral Triangle initiative several community initiatives have established Local Marine Areas (LMMAs). These have a range of different management restrictions and level of protection through the use of no take zones. (see Figure 9). A list of these different levels of conservation appears in the following Table 1.

Table 1. Number of Areas under Conservation in PNG

Status	Designation Level		
	Terrestrial		Marine
	National	Local	
Designated (Gazetted)	39		9
Designated (Local)		21	12
Proposed		3	
Voluntary		16	16
Draft	1	9	4
Unknown	9	9	9
Dispute		3	3
	49	61	55

The total land area of PNG under formally recognised conservation is 1,897,595ha, 91% of which is within Wildlife Management Areas (WMAs) and 4% within the current Conservation Area (CA). This represents approximately 3.8% of the countries land area. Within the *Policy on Protected Areas 2014* it indicates that the status of these protected areas must be determined as part of the process moving forward as some of this area has been degraded through development projects. Under RAPPAM assessment many areas were no longer under any form of active management.

3.8% - of PNG land is under formal Conservation protection

The approach to marine conservation has to date been quite different to that of historical terrestrial conservation. Several WMAs were previously established in marine areas, though in recent years the trend has been the establishment of Local Marine Management Areas around the country. These combine zoning as well as rules in their management with conservation as a fisheries management tool.

.00047% of PNG sea is under formal Conservation protection

.005%* of PNG sea is within a LMMA

* Or .076% of the Inshore Fishing Area

2.1.2 Species Status

Papua New Guinea is a high biodiversity country. This high biodiversity richness is expected with PNG lying in the tropics and containing many ecosystems across both altitude/bathymetry gradients and latitude. These

ecosystems often have high biodiversity richness and with so many species, so few are well known.

The Mammals have been assessed under the Global Mammal Assessment and likewise the frogs under the Global Amphibian Assessment, and all birds have been assessed. However the gaps in taxonomic group assessment are Plants, Reptiles, Reef Fish and Molluscs, which represent important elements of our tropical vegetation and marine biota (see Figure 10). The invertebrates are a very large group that are also have estimates of a large number of still undescribed species.

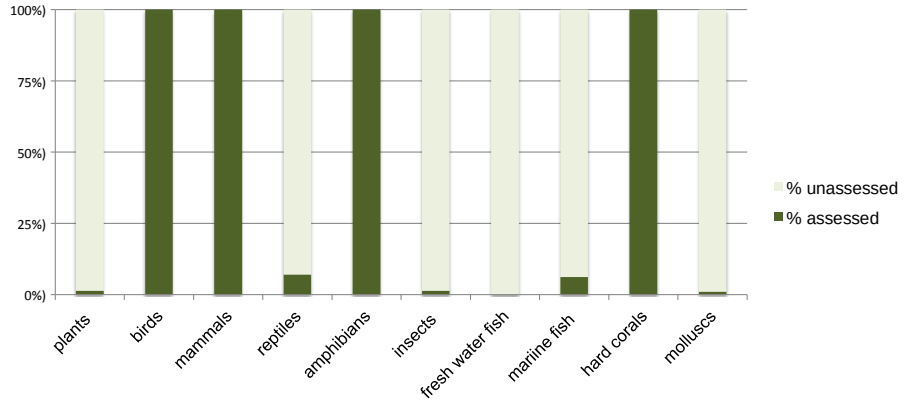


Figure 10. Percentage Assessed and non assessed described species for selected taxa for PNG IUCN 2014.2.

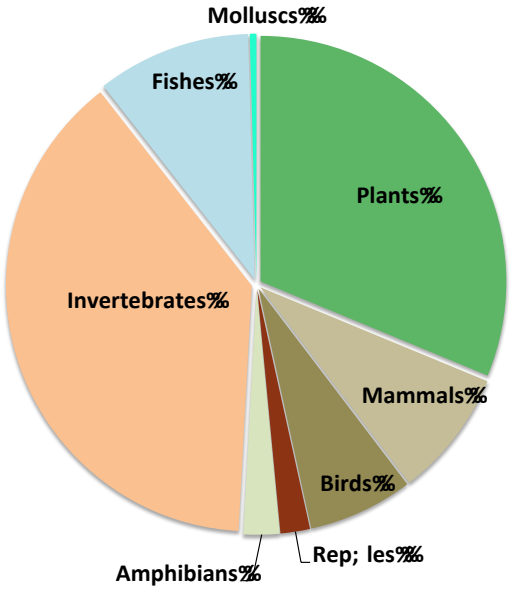


Figure 11. Number of threatened species by taxa IUCN 2014.2

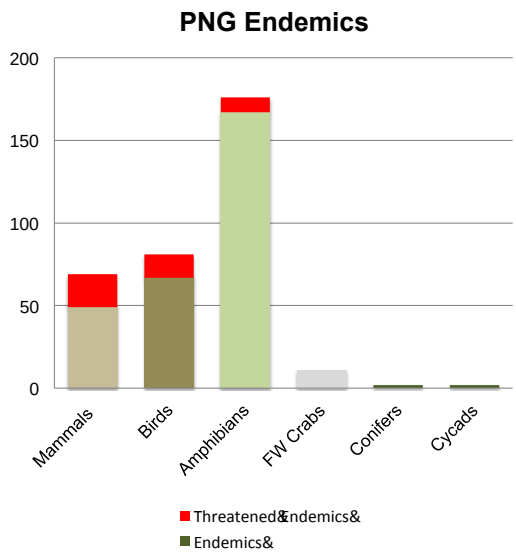


Figure 12. PNG Threatened Endemics for selected taxa IUCN 2014.2

From Figure 12, it can be seen that the PNG mammal endemics are the most threatened as per the IUCN red list, of the taxa assessed. Followed by birds and amphibians. The total animal species threatened are 319 and plant species 133 in 2014 (see Table 2 and Figure 13)

Table 2 PNG Red Listed species (2014.2)

Red List	Animals	Plants
EX	1	0
EW	0	0
CR	20	13
EN	42	14
VU	257	116
NT	251	38
LR/cd	3	0
LC	1970	302
DD	415	36
Total	2959	521

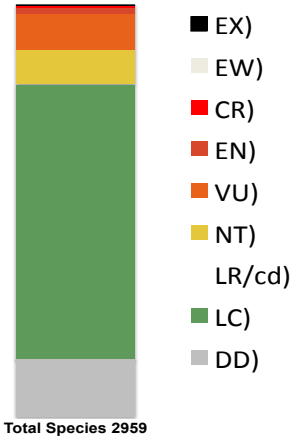


Figure 13. PNG Red List Category Animals (IUCN 2014.2)
EX Extinct, EW Extinct in the Wild, CR Critically Endangered, EN Endangered, VU Vulnerable, NT Near Threatened, LR/cd , LC Least Concern, DD Data Deficient

2.2 Biodiversity trends

Table 3. Change of IUCN Red list Category of Species that occur in PNG or its EEZ 2010-2014

Scientific Name		Common Name	IUCN Redlist year		Version
Species changing IUCN Red list Status (2013-2014)			**2013**	**2014**	
Paradisaea	*decora*	Goldie's Bird of Paradise	NT	VU	2014.2
Species changing IUCN Red list Status (2012-2013)			**2012**	**2013**	
Gouria	*victoria*	Victoria Crowned pigeon	VU	NT	2013.2
Lepidodactylus	*mutahi*	Bougainville's scaly-toed gecko	LC	DD	2013.2
Agathis	*labillardieri*	New Guinea Kauri	LC	NT	2013.1
Lagarostrobos	*franklinii*	Huon Pine	LR/lc	LC	2013.1
Dermochelys	*coriacea*	Leatherback Turtle	CR	VU	2013.1
Parapistocalamus	*hedigeri*	Bougainville Coral Snake	LC	DD	2013.1
Species changing IUCN Red list Status (2011-2012)			**2011**	**2012**	
Pyrrhura	*vulturina*	Vulturine Parrot	LC	VU	2012.1
Species changing IUCN Red list Status (2010-2011)			**2010**	**2011**	
Thunnus	*alallunga*	Albacore Tuna	DD	NT	2011.2
Thunnus	*albacares*	Yellowfin Tuna	LR/lc	NT	2011.2
Xiphias	*gladis*	Swordfish	DD	LC	2011.2

CR Critically Endangered, EN Endangered, VU Vulnerable, NT Near Threatened, LR/lc , LC Least Concern, DD Data Deficient

2.2.1 Trends in Terrestrial Biodiversity

Based on the known threats to biodiversity it is assumed that biodiversity is negatively impacted. There are very few monitoring programs of ecosystems or species.

Mammals across PNG are targeted as a source of protein for rural communities and also for some cash sale in markets. Where habitat is being lost, degraded or converted to another use this also impacts upon the species that is dependent upon it. There are conservation efforts on the tree kangaroo species however this has not yet had sufficient impact to downgrade those which are have an IUCN red list threat status.

33% of endemic mammals threatened

In this reporting period one species of Bird of Paradise, the Goldie's found on two satellite islands of PNG has been upgraded to Vulnerable due to loss and fragmentation of its habitat from subsistence farming, commercial logging and mineral exploration within its habitat. The Vulturine Parrot with a patchy distribution in the foothills across the Island of New Guinea has also been upgraded to Vulnerable (see Table 3).

19% of endemic birds threatened

30% of endemic birds of paradise threatened

PNG Forests

A state of the forests report 2010-(2012)-2014 was submitted for approval in June 2014. Based on imagery and data this will indicate the current changes to the forests of the country. Currently the changes known are those from now out-dated reports. However the impacts from logging, the logging from Special Agriculture Business Leases, subsistence agriculture and other developments continue either in new areas or on the fringes of current activities.

2.6%± annual loss of lowland forest

2.2.2 Trends in Marine Biodiversity

Papua New Guinea has a valuable and extensive fisheries sector ranging from inland river fisheries and aquaculture to coastal reef fisheries and deep water tuna fisheries.

Over 90% (2010) of coastal and near shore resources are under customary ownership. Much of this is impacted by the tragedy-of-the-commons where with increasing populations, food requirements and needs for cash income, fishers exploit the entire marine resource. This leads over time to its loss of resilience and subsequent degradation of the marine ecosystem. Also the selective targeting of top predator shark species and detritus feeder, sea cucumbers for cash income by fishers has to an unknown degree, impacted upon the ecological integrity and balance of the marine ecosystem.

The trends of impacts to the marine environment from subsistence and artisanal fisheries based on participatory rural appraisal usually finds a decreasing resource, especially where no proactive sustainable management is in place.

Biodiversity studies in 2000 indicated that the reef condition index was robust. However with riverine tailings disposal, deep sea tailings disposal, potential sea bed floor mining and runoff from other land based developments this will be increasingly impacted especially in localised areas of activity.

The *State of the Corals Report 2012* stated that a significant loss of coastal fisheries is very evident along the coastline of PNG. Major populated provinces that have depended heavily on their marine resources to sustain their livelihoods have become under stress from fishing pressure and the methods of fishing while other factors including easy access to distant or protected fishing grounds by outboard powered engines and fiberglass boats.

Many reefs in PNG are close to shore and sensitive to terrestrial influences. A limiting factor in determining trends in marine biodiversity is that the research and monitoring capacity in PNG is relatively low with most programs run by NGOs, with few long term datasets for PNG reefs. There are also few Locally Managed Marine Areas LMMAs in PNG and awareness and support for marine resource management is mostly limited to areas where NGOs have active programs, such as in Manus, Kavieng, Kimbe Bay, Madang, Milne Bay and Central.

Trends of marine resources of the LMMAs in Kimbe Bay where management is in place is that they are improving. This however is based on resource managers perceptions rather than on hard empirical data. LMMAs in Milne Bay have been monitored but only over two years, therefore there are insufficient data points over time to have confidence that trends are correlated to management actions.

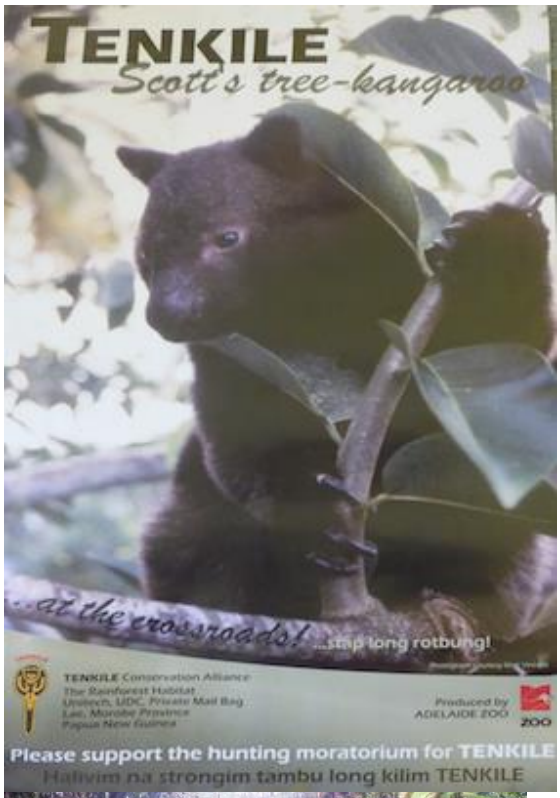
There are concerns on the status of the turtle species which migrate to PNG from take by fishers. Although leatherback turtles status has changed from Critical to Vulnerable within PNG the main nesting beach is under mineral exploration.

2.3 Case Studies

2.3.1 Tenkile Case Study

A case study on an increasing population based on survey and local perspectives

The *Tenkile* Conservation Alliance in the Torricelli Mountains of north-west Papua New Guinea is the habitat of the Scott's Tree Kangaroo *Tenkile* CR A4cd, the Golden Mantled Tree Kangaroo *Weimang*, CR A2cd: B1ab(I, ii, iii, iv,v), C1 and the Grizzled Tree Kangaroo *Yongi,* VU A4cd.



 Clockwise from bottom left
Figure 14. Awareness Poster of *Tenkile*
Figure 15. Field Survey Akon
Figure 16. Field Survey Akon

Since 2003 there has been a hunting moratorium on *Tenkile* (see Figure 14) that in 2012 includes 20 villages with *Tenkile* on their land. From distance sampling between 2004 and 2008 the total population of *Tenkile* increased 92% from 160 to 307 and numbers are still increasing during this reporting period to 2014 (see Figures 15 & 16).

Since 2007 there has been a hunting moratorium, that in 2012 includes 30 villages in the alliance with *Weimang* on their land. Distance sampling of *Weimang* was initiated in 2010 with results still to be evaluated. The numbers of both species has increased since the hunting moratoriums have been in place.

So the hunting moratorium, as well as community development projects, has worked.

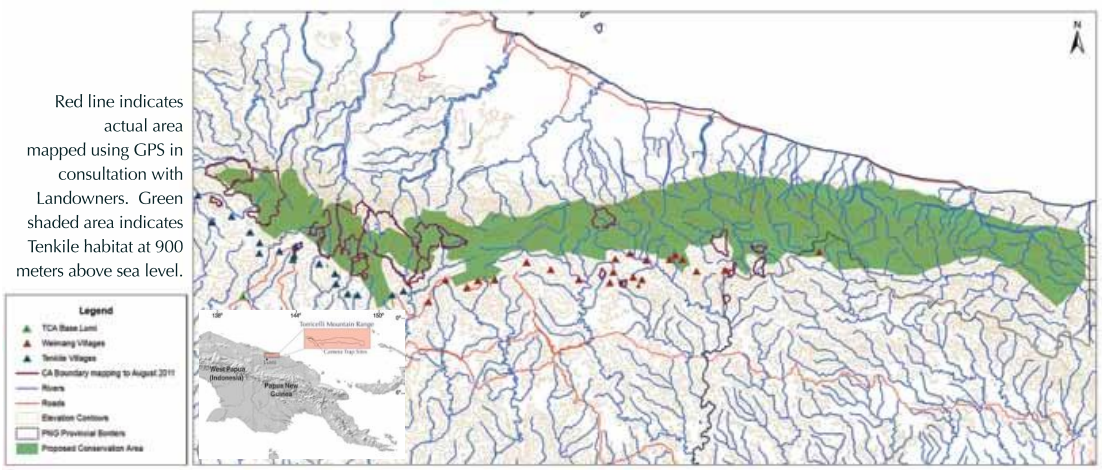


Figure 17. *Tenkile* Range ~150km^2, Areas under conservation and villages

The *Weimang* have a larger distribution than *Tenkile*, ~350km^2, and less people surrounding their habitat. The *Weimang* population is probably greater than 500 in the Torricelli's and it is also found also in the Foja Mountains of, Papua Province, Indonesia. There have been a few animals killed in the past

few years, but only when they have ventured into village gardens. There has been no active hunting of this species since 2007.

In the Torricelli's there is also the Black Spotted Cuscus CR A4cd and Northern Glider CR B1ab(iii,v) within the same area of interest. The Northern Glider is just found in the foothills of the Torricelli's. Most of its distribution is within the Conservation Areas established by the villages. The Black-spotted Cuscus's distribution goes as east as Madang and west into Papua Province. TCA has a fair chunk of its distribution locked up with our stakeholders Conservation Areas - but it is still readily hunted. Many outside villages have this species on their land.

If TCA is able to extend its program to include more villages then we will hold these two species as flagships.

Villagers have reported many other species making a comeback as well, "people come to my office in Lumi with tears in their eyes saying they have seen a species only their fathers told stories about" (Jim Thomas *pers comms* 2014), such species as the Gouria Pigeon and Palm Cockatoo. This is an expression of the realisation of the 4th Goal of the PNG Constitution that "…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 generations"

2.3.2 Netuli Local Managed Marine Area

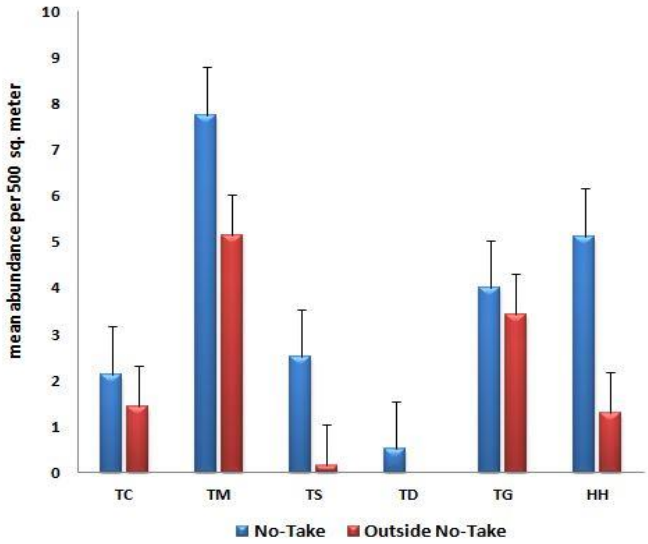
A case study on increasing populations based on local perspectives with initial trend survey data

The community on Netuli Island in Milne Bay Province (see Figure 18) used their own initiative to set aside an area of their reef (see Figure 19) and set their own rules. They had received awareness on sustainable management principles and from this applied them to their situation. Their reefs had been exploited through a typical 'tragedy of the commons' and they made the decision to set aside areas of reef (see Figure 20) and spawning aggregation sites in what was effectively a community marine management area in 2012.

Anticlockwise from Bottom left
Figure 18. Inset Map of Milne Bay Province , PNG
Figure 19. Wialoki Island Principal Landowners with their LMMA Map
Figure 20. Panabala Rock outcrop and associated reef No-take-zone.

From this decision the community have seen the recruitment of Giant Clam including Southern Giant Clam VU A2cd and Giant Clam VU A2cd within the No-take-zones of the LMMA and that Humphead Wrasse EN A2bd+3bd *Mami* now have higher numbers of different ages compared to previously. Also other species such as the Bumphead Parrotfish VU A2d *Belabela* numbers are recovering.

Conservation International established monitoring transects and trained local community members in 2012/13 (see Figure 21) to record any changes in the fish fauna and reef as a result of the communities' management decisions. Initial survey trends for giant clams (see Figure 23) indicate that recruitment of new clams in protected areas has occurred (see Figure 22).



Anticlockwise from bottom left
Figure 21. Local Wialoki Islander recording biodiversity on transect
Figure 22. Giant Clam species Mean Abundance one year after initiation of no take zones
TC *Tridacna crocea,* TM *T. maxima* TS *T. squamosal*, TD *T. derasa*, TG *T. gigas*, HH *Hippopus hippopus*
Figure 23. Giant Clam *Tridacna gigas*
Taken from Wialoki, Nataoli & Panabala CMMA Marine Resource Monitoring Program Reports

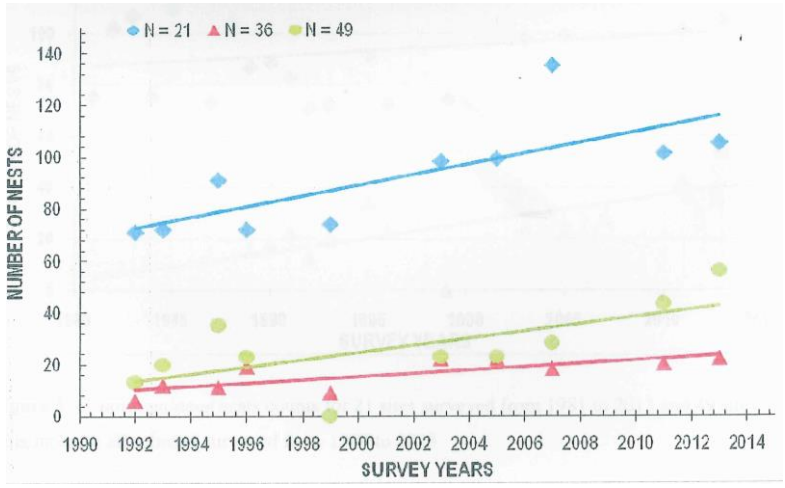
This process and results are shared within the PNG Learning Training Network and through the CLMA Community Local Management Area network throughout Papua New Guinea.

2.3.3 CITES Crocodile Exports

A case study of a regulated stable population based on export figures and surveys

The Department of Conservation is required to report on the export of CITES II species. The only species which combines population survey estimates with the collection of eggs and permitted skin exports are the Salt Water Crocodile Lr/LC and New Guinea Crocodile Lr/LC.

Surveys of the number of nests has been done over the last 20 years (see Figures 24 & 25) and at all sites shows a gradual increase (see Figure 26). Management decisions and regulation of take of crocodile are then made. Strict reporting of crocodile skin exports to CITES through annual reports is also a check of this

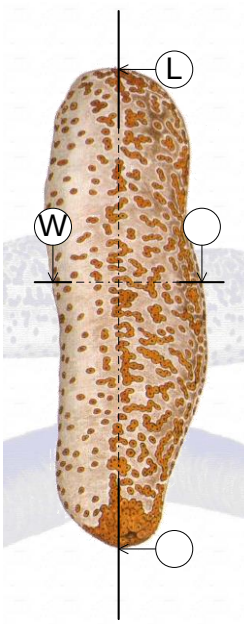


Clockwise from bottom left
Figure 24 Survey map of survey area
Figure 25 Helicopter drop of team during egg collection from nest
Figure 26 Number of nests 3 sites from 1992-2014

2.3.4 Beche-de-mer, processed Sea Cucumber

A case study of a regulated but overfished population based on export figures, with subsequent industry closure and follow-up monitoring to determine rates of species recovery

The National Fisheries Authority NFA manages this resource under the National Beche-de-mer Fishery Management Plan. Within the marine ecosystem twenty one species of this detritus feeder are exported to overseas markets.



Measuring length and width of sea cucumbers

Figure 27

A National Management Advisory Committee was formed and includes stakeholders from across the country. It provides advice to the Managing Director of the National Fisheries Authority on most of the key management measures as well as the need for revisions to the plan.
Management measures prescribe the type of licenses, licence eligibility, licence requirements, export requirements, prohibitions, closures and reporting requirements. Licensees are closely monitored by the NFA to ensure they comply with all management measures.

A Total Allowable Catch (TAC) is set for both the higher value species and the lower value species, as the more valuable species are more heavily fished. Once the TAC of a value group has been reached, the NFA closes the whole fishery as it is too difficult to monitor the harvest of just one value group. Trade in undersized (see Figure 27) or broken beche-de-mer is banned to protect the population.

A closed season applies for the whole country during part of the spawning season from 1st October to 15th January. The fishery in each province closes when the TAC of a value group is reached.

Despite management being in place this resource was harvested unsustainably leading to a closure of the harvest by NFA since 2009. This was based on the premise of 'Economic sustainability is dependent upon ecological sustainability' of this resource.

Since the closure NFA has done monitoring of the stocks of sea cucumbers by species in various maritime provinces. The results of these surveys are sensitive due to the value of the industry which will reopen when stocks have recovered.

3 *Main threats to biodiversity in PNG*

There are many drivers and threats to biodiversity that interact with each other often causing cumulative impacts.

3.1 Population / Subsistence Agriculture

The total population of PNG has been increasing at between 2.1% and 3.2% per year since 1966-2009 with an average rate of growth over this period of about 2.5% per year. At this rate of increase, the total population will double around every 30 years. In the five years since the last report to CBD the population of PNG would have increased by over 500,000 people.

These additional people place extra requirements on the environment, both locally and over the horizon. Of these people around 80% live in rural villages

and who cultivate 25% of the land in PNG, predominantly under subsistence agriculture. With this increasing rural population remaining food self sufficient from subsistence therefore requires either, bringing more land, often marginal or forested land into subsistence agriculture production or decreasing the period of rotation causing a succession of the fallow vegetation progressively from secondary forest, eventually to grassland. Another strategy for food security is through the generation of income to purchase food from the sale of environmental capital or production from cash crops. The greater requirement for food and or cash therefore progressively impacts upon the peoples' environmental capital, of ecological sustainability, species and habitats over a large part of the country.

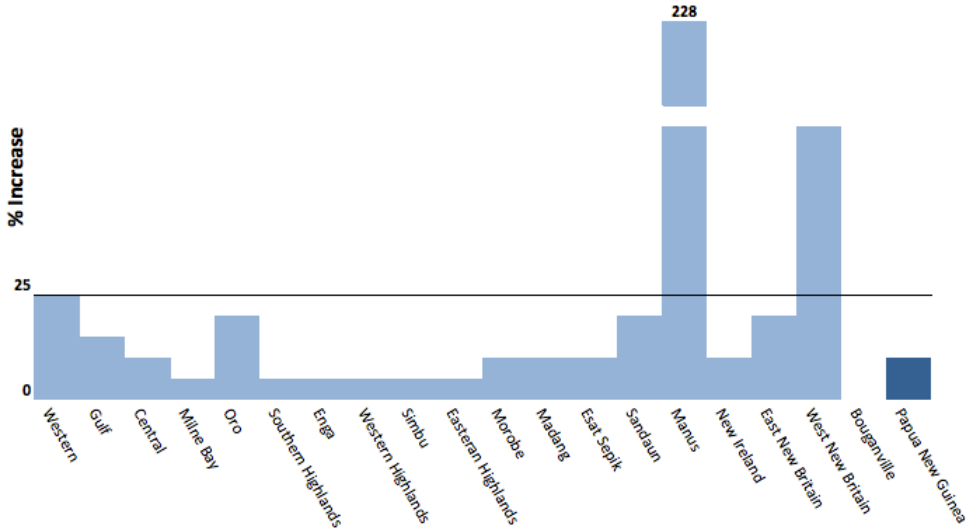


Figure 28. Percent Change in Village Land Use 1975-1996 by Province

The changes in Land use (see Figure 28) have increased by 11% in the thirty years (doubling of population) from 1975 to 1996 with the conversion of 3.6 million hectares cut into the subsistence fallow. It is anticipated that this trend has continued in the years since then. Actual figures of forest cover change from subsistence agriculture (logging and other causes) are sensitive and though not currently available will be in the PNG Forest Authorities *State of the Forest* update later in 2014.

Land Use Intensity

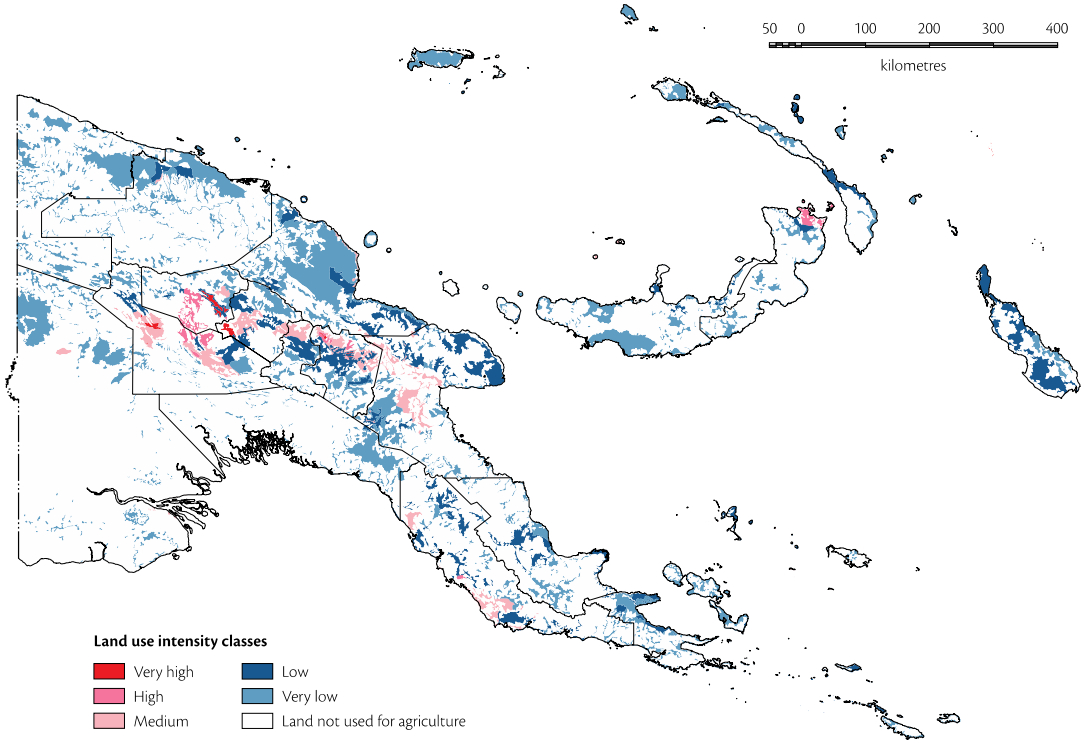


Figure 29. Land Use Intensity

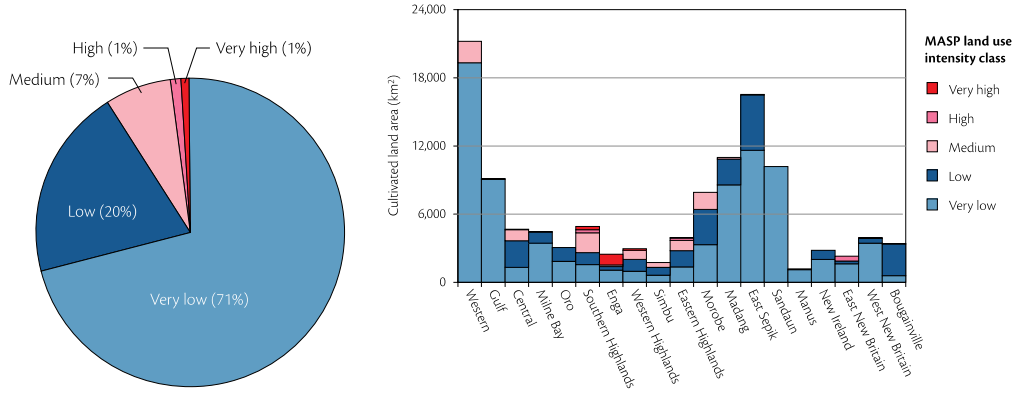


Figure 30. Proportion of Cultivated land by land use intensity (1995)
Figure 31. Cultivated land area by land use intensity by province (1995)

From Figures 29 and 31 it can be seen that the land use intensity is variable across provinces.

Most of the projected agriculture-related emissions from land use and land-use change will rise most significantly from 24–37 Mt CO_2e p.a. currently to 29–47 Mt CO_2e p.a. in 2030 come from deforestation and degradation caused by subsistence agriculture. Population growth and a shift into cash cropping among smallholders are direct and indirect drivers of encroachment into forests. Subsistence-related activities other than agriculture, such as the collection of fuel-wood are not currently major drivers of deforestation and degradation, as fuel-wood needs are adequately covered from clearance of fallow land. It is estimated that current fuel-wood need is ~3.8 m tonnes annually and it will grow to ~5.5 m tonnes in 2030. Using conservative estimates, there are ~13 m tonnes of fuel-wood from the fallow land annually.

But collection of fuel-wood could play an increasing role, thanks to the growing population, urbanisation and a shift to more permanent agriculture.

11% Land use change during recent generation

3.2 Commercial Logging

PNG has approximately 463 million hectares of land of which 77% (36 million hectares is natural forest that contains 5%-7% world's species of plants and animals. Only 17% of the natural forest (8 million hectares) is suitable for economic logging where close to half (3.5% million hectares) has already been logged.

In 2002 71% of Papua New Guinea (33 Million ha) is made up forest consisting of mountain, dry evergreen, swamp and mangrove forests.

From these forests the log exports for 2011 were 3.5 million cubic meters which was the highest volume ever recorded. The average from 2000-2006 being 2.3 million cubic meters. Due to the sensitivity of these exports more recent figures are not currently available from PNG Forest Authority. In addition to known exports the estimated unlicenced export is around 14% implying that significant volume is exported beyond the official figure. (CH2014). The changes to loggable lowland forest is therefore significant even if only through the best practice of selective logging which changes the forest ecology by the targeting of commercial tree species.

Forestry emissions will increase in line with the timber export volumes highlighted above, from 49–51 Mt CO_2e p.a. currently to 45–62 Mt CO_2e p.a. in 2030 (the wide range reflects uncertainty about future policy). This is based on historical rates of deforestation and degradation associated with logging, with an estimated 15% of area becoming deforested and the remainder degraded secondary forest after logging. It should be noted, however, that by 2030 the availability of commercially accessible forests will depend on the renewal of current FMAs (Forest Management Agreements). Furthermore, there is approximately three million hectares of primary forest yet to be acquired for various forest development options; much of this would become unavailable if the government allocates more of it to protected areas.

3.3 Protected Areas, Subsistence Agriculture and Commercial Logging

Shearman & Bryan (2010) indicated that commercial logging had been occurring within protected areas, with 2.2% of gazetted conserved rainforest degraded through logging and a further 6.7% by subsistence agriculture between 1972-2002. (see Figure 32) This highlights the issues of a need for land use planning and compliance across the country especially within the Provincial Forest Management Plans. It also highlights the need for greater

management input into gazetted conservation areas along with mainstreaming of conservation and effective compliance mechanisms.
It must be noted however that many endemic forest species in Papua New Guinea occur on mountains that are not a part of the potentially loggable forests.

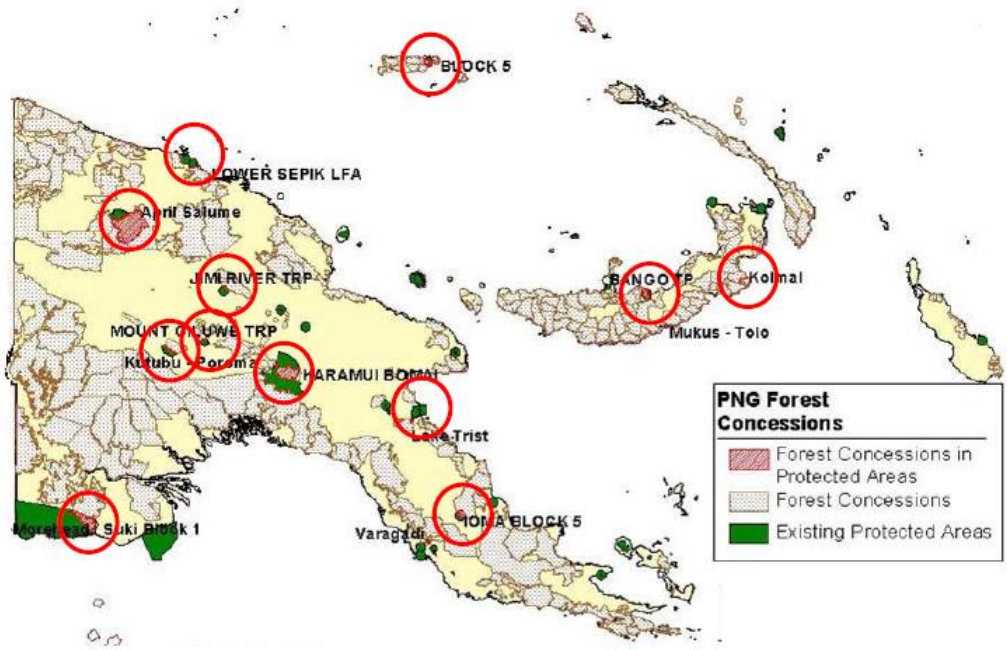


Figure 32. Protected Areas threatened by logging RAPPAM 2009

8.9%* of Conservation Areas degraded 1972-2002

* From all causes

3.4 Forest Change in relation to Climate Change

With climate change, increased temperatures across the altitudinal gradient that forests and fauna that depend upon them will be impacted. Forest plot monitoring is done across the country by the Forest Research Institute. Transect studies have been done within the YUS Conservation Area and from Brahman to Mt Wilhelm that through future research may answer what some of these climate impacts are.

The natural capacity of New Guinean forest species to adapt to changing climate is unclear. Genetic diversity plays a critical role in the survival of populations in rapidly changing environments. Tropical forest plants may respond to climate change through phenotypic plasticity, adaptive evolution, migration to a suitable site, or localized or outright extinction Many tree species of Papua New Guinea have wide ecological ranges. Along with changes in phenology, reduced genetic diversity due to forest fragmentation and deforestation as a result of human activity or climate change, may reduce

genetic variation by causing extinction of genetically unique populations, disrupting gene flow. The response of forest trees to climate change will also depend upon the responses of, and interactions with, a wide variety of other organisms. Changes in climate during critical phases of the life cycle such as flowering, seed development, and seedling establishment, may have much greater effects than the direct effects of climate change. The rate at which species can respond or genetically adapt to climate change will be dictated by their life span and generation cycle. Even more critical for spatially and environmentally variable PNG systems is that different plant species and even genetically distinct populations of the same species may have unique ecological niches and may respond differently to change in climate.

Many ecological systems are sensitive to changes to rainfall patterns (see Figure 33). Reductions in rainfall leading to water stress can kill plants and animals, and change the community structure of forest. Changes in the flow patterns in response to changes in rainfall, with have flow-on effects on associated plants, animals and nearshore marine populations and habitats.

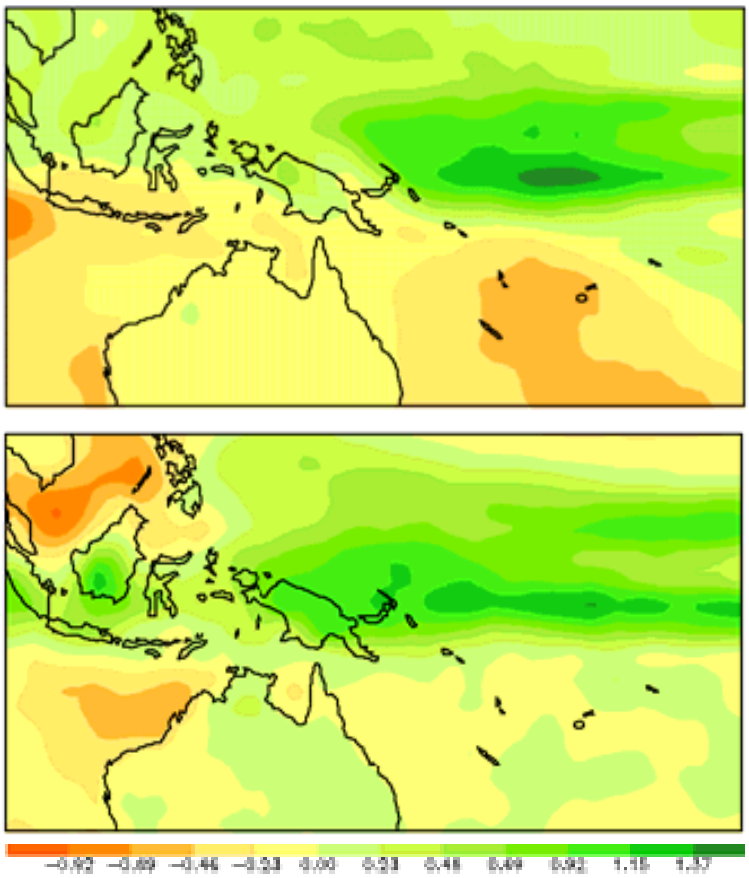


Figure 33. Projected precipitation minus evaporation, winter (top) and summer (bottom) for 2090.

Changes in soil moisture availability caused by global climatic change and forest fragmentation are likely to alter tropical species distributions, community composition, and diversity. Conversely, predicted climate change may be unlikely to affect the physiognomy of rainforests with high annual rainfall and

low seasonality, such as those of New Guinea. The rate and extent of future changes cannot be predicted at this time.

Drought and associated fires resulting from the periodic ENSO climatic cycles are a significant ecosystem disturbance for PNG. An increased pyric fire succession reduces the vegetation from forest-type to shrub-type communities, with frequent fires reducing the plant community to fern or grasslands. The changes of plant community is a dramatic change of available habitat for fauna that depends upon it.

We cannot predict the climatic changes on a relevant scale, or how changing climate will affect key biotic variables, and we know so little of PNG fauna that we do not currently know what changes will occur directly and indirectly from climate change. However species populations could experience significant reductions where environmental alterations occur that depress food availability or alter the timing of its availability.

The survival, composition, and diversity of mangrove communities will depend on local factors, such as groundwater availability, salinity, substrate type, sediment input, degree of sea level rise, impacts of on shore winds and tidal surges, that alter with localized impacts of climate change. This will alter the association of fauna that are associated with the mangrove ecosystem.

3.5 Plantation Sector

Within the reporting period of this report the increase of areas planted to oil palm has not been great. In 2013 New Britain Oil Palm had 73,000ha under oil palm, 7700ha under sugar and 9200ha under pasture. A further 970ha of oil palm was planted in 2013. In the next decade however this is set to change with the Oil Palm development in the Yangoru-Saussia of the Sepik which is aiming for 200,000ha under oil palm.

Currently all Oil Palm producers in PNG are RSPO (Round Table Sustainable Oil Palm) compliant with no direct conversion of forested areas to oil palm. The existing plantations have localised environmental impacts of the lowland areas of New Britain, Northern, Milne Bay provinces and the Ramu Valley of Madang province. The intensification of land use on the Popondetta Plains that includes oil palm has impacted upon the viability of the lowland population of the Endangered Queen Alexandra Birdwing Butterfly. Large areas of monoculture plantation are a barrier to movement of biodiversity across the landscape.

Current Land Use, Land-Use Change and Forestry (LULUCF) emissions are estimated at 80–97 Mt CO_2e p.a. and would increase by up to 32% by 2030 to 89–128 Mt CO_2e under a BAU scenario. LULUCF makes up 95% of Papua New Guinea's current emissions and several sectors have been identified as the main drivers of deforestation and degradation: timber extraction, smallholder agriculture (expansion into forest and shortening of rotation cycle) and commercial agriculture (especially palm oil plantations).

3.6 Hunting

Areas accessible and proximal to villages, tracks, navigable rivers and roads allow for hunting to take place. There is hunting pressure especially of mammals and birds, but also some python, fish, eel and shrimp as protein sources. Also bird plumes and fur feature in traditional dress and in exchanges on important customary occasions that are still strong across many regions of Papua New Guinea. Some of these make it to the cash market sector putting additional pressure on these targeted species.

The total effect of hunting pressure on the biodiversity of PNG is not currently known. There are projects which monitor a few selected local, cultural, economically important species.

3.7 Destructive Fishing practice

The PNG's EEZ 2.4 million square kilometers is the richest in the South Pacific. The fisheries zone includes an extended reef system, numerous islands, extensive coastline and archipelagic waters. These create huge opportunity but also present an enormous challenge for monitoring and control. Small scale commercial fisheries, a medium scale domestic prawn fishery and international interests operating purse seine tuna fishing vessels and tuna long-lines. Tuna take is monitored by species within the archipelagic waters and is near the total allowable catch and hence sustainability.

Direct harvesting of marine resources includes overharvesting and destructive fishing methods. These pose a serious threat to the marine resources.

By-catch is also a serious issue from a number of different commercial fisheries and best practices have either been put into place or are occurring.

3.8 Climate Change in a Marine Environment

Climate change is potentially a high threat to the marine species and their habitats in PNG through the potential disruption of ocean circulations, changes in the amount and distribution of fish populations, changes in the seas salinity, temperature and acidity, and other parameters. Current climate change models include a wide range of potential future scenarios. A Study by CSIRO (2011) predicted that many of the reef systems would be impacted by Coral Bleaching in the Bismarck Sea and to a lesser extent in the Solomon Sea by 2062 (see Figure 34).

Predicting Change in the Marine Environment from Climate Change
Current and projected Sea Surface Temperature (SST) averages show a steep gradient in temperature from higher to lower latitude. The cooler waters of the Coral Sea mix with the warmer waters of the west Pacific Warm Pool to form this gradient.

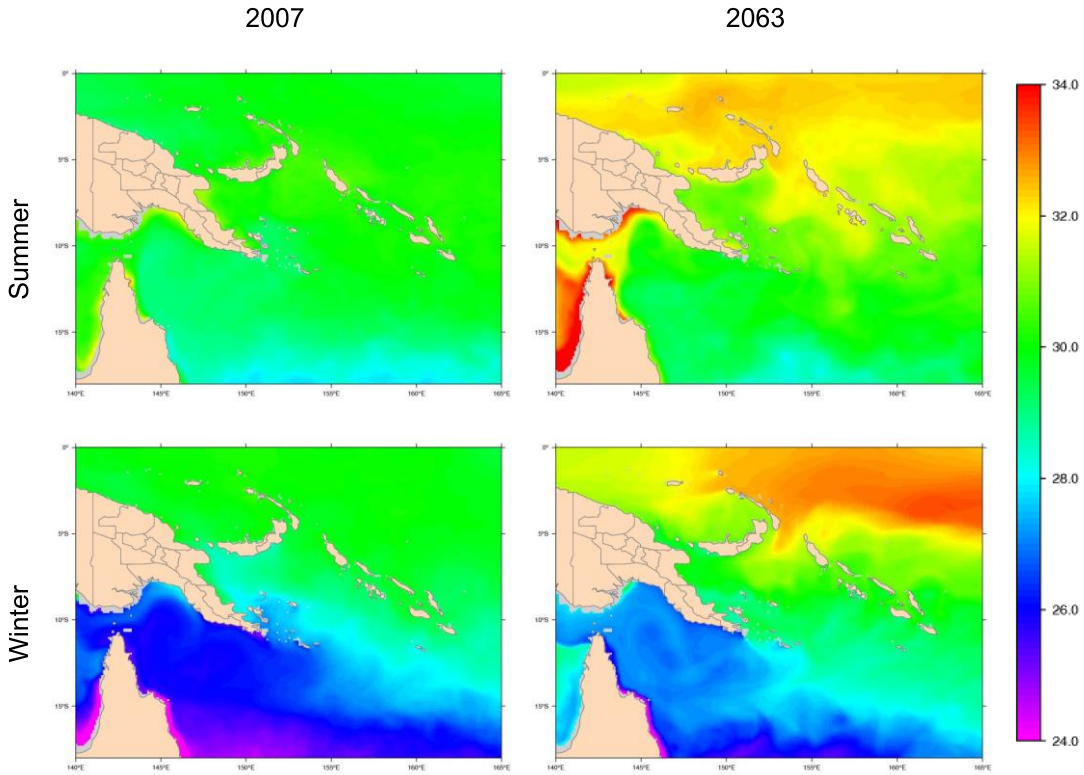


Figure 34. Three Month Average of Sea Surface Temperature (CSIRO Bluelink Modeled Ocean Climatology)

Coral reefs are vulnerable to increased SST due to temperature induced coral bleaching even to a depth of 20+ meters. The currently accepted threshold for bleaching is when sea surface temperatures are more than 1°C higher than normal summer maximum temperatures, though an absolute threshold of 32 degrees C has also been used. Degree-Heating Weeks (DHW), the sum number of degrees weekly water temperatures are above the bleaching threshold and 8 DHW has been a good indicator of bleaching risk which is indicated in Figure 35.

The ability of reef corals to adapt or acclimatize to projected climate change is probably not great but this is not really known.

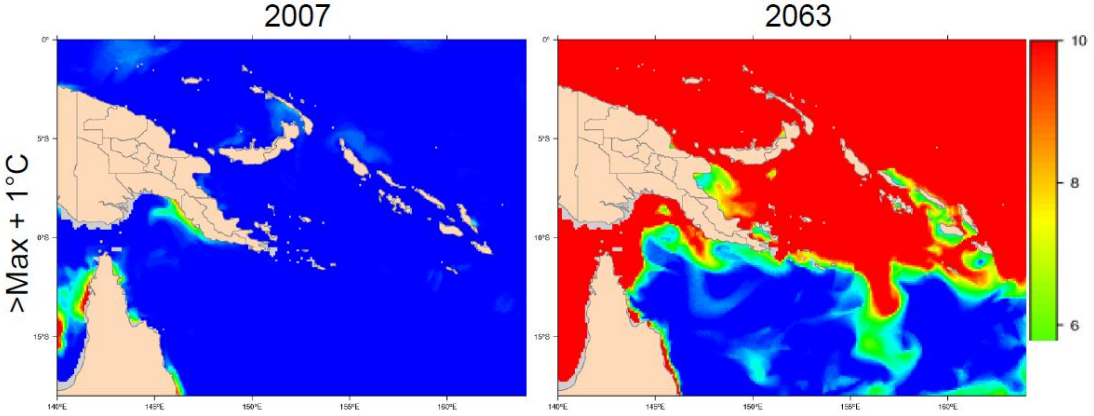


Figure 35. Projection of Degree Heating Weeks of Sea Surface Temperature

With the loss of corals the association of reef fish will change, probably flip to an algal association with more herbivorous fish.

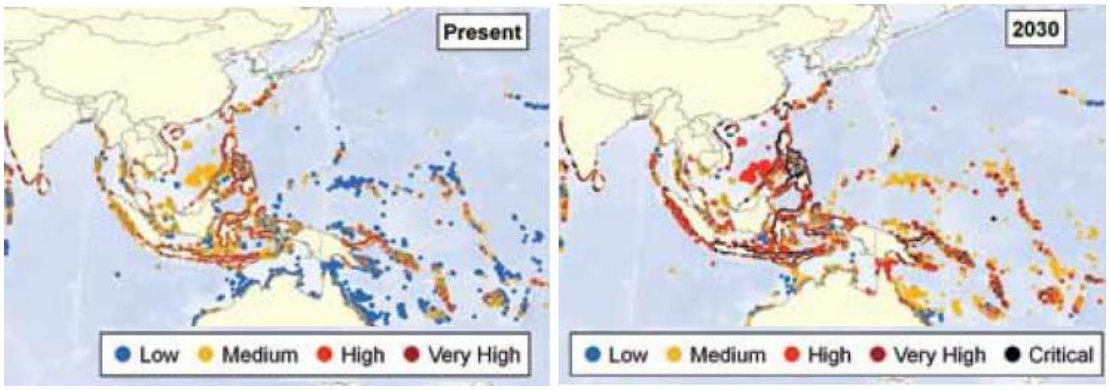


Figure 36. Reefs at risk, all factors.

Even on a shorter time line the risks to reefs is becoming greater from all sources (see Figure 36).

Rising sea levels are altering the coast both through incremental change and through elevated storm surges, while the inundation of salt water into coastal aquifers will put pressure on water resources, especially within island ecosystems and communities.

3.9 Pollution

There is localized pollution from inland and coastal urban centres of debris, toxic chemicals, and untreated sewage. The impacts of these are currently not known but are increasing due to increasing urban populations. This is an issue of all growth centres including provincial and district centres.

Within PNG there is no facility for the proper recycling or retrieval of heavy metals from batteries and e waste. With an increased use of goods that require batteries, increased use and turnover of computers e waste is increasing at an unknown rate. With 2G and 3G network coverage reaching across most settled areas of the country in 2014 the disposal of mobile phones this is another an emerging issue that has not been addressed. These remain disposed of in the current landfill sites or across the country with the risk of infiltrating soil groundwater and stream runoff.

3.10 Extractive Industry

The mining operations across Papua New Guinea are many and varied (see Figure 37). The majority of current mines are open pit. The development plans of these open pit mines in Papua New Guinea have indicated that there are huge challenges in the disposal of tailings, referring to high levels of rainfall and tectonic activity across the country. Riverine disposal (Ok Tedi >22million tonnes pa, Porgera >5 million tonnes pa, Tolukuma >160,000 tonnes pa) and

Deep Sea Tailings disposal (Misima, Lihir >5 million tonnes pa, Ramu-nickel >5 million tonnes pa, Simberi >1 million tonnes pa and the future Woodlark mine). These tailings have greatly altered the ecology of the immediate riverine and marine environment from the resultant sedimentation. The Hidden Valley mine is the exception being the first to have a tailings storage facility in PNG.

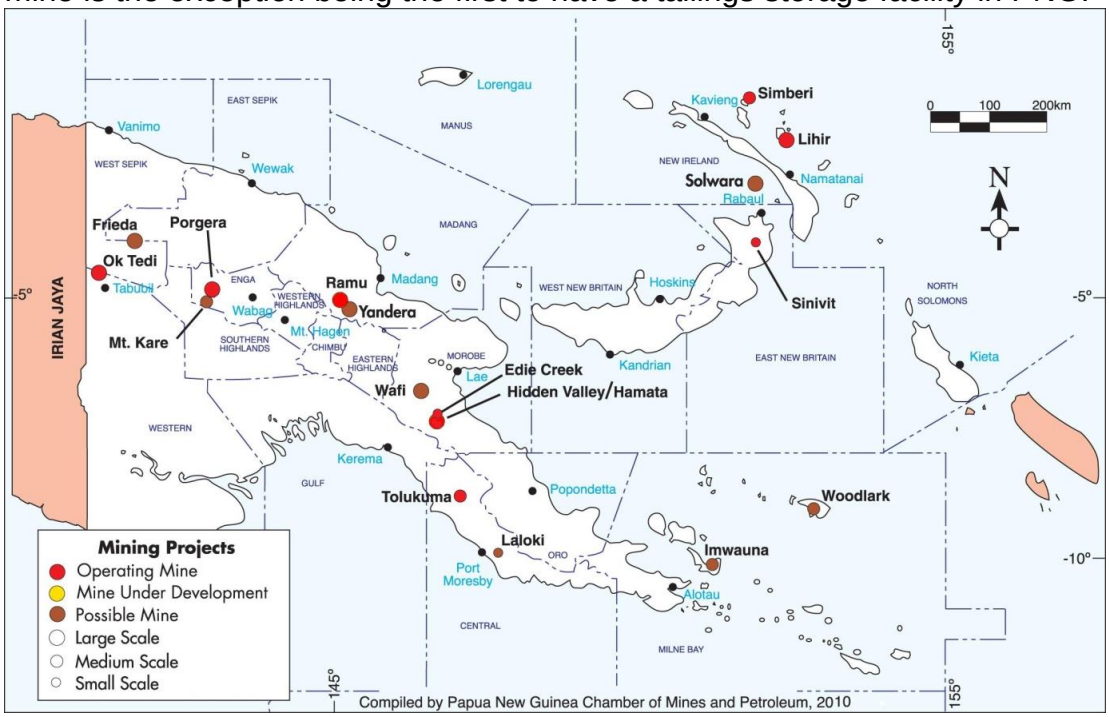


Figure 37. Mines and Proposed Mines 2010

A study released in 2014 indicted that environmental pollution from the discharge of tailings by the Ok Tedi mine into the Fly River system had a signature as far as the Torres Strait region of Australia.

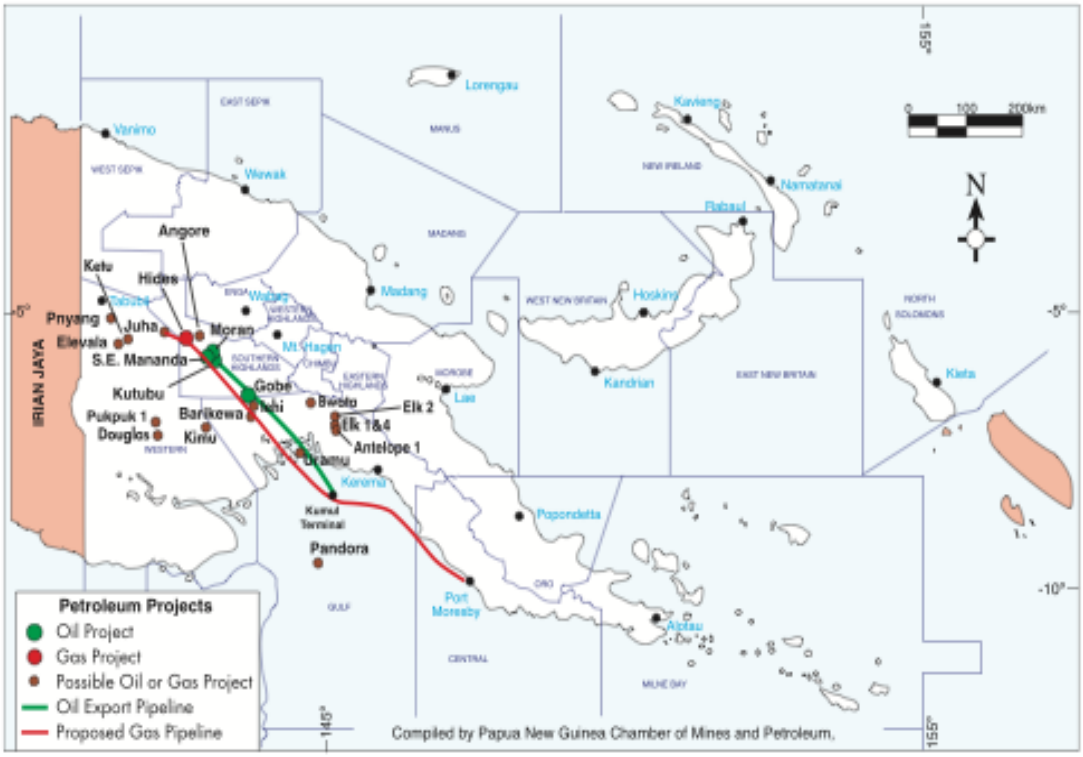


Figure 38. Existing and Proposed Oil and Gas 2011

The overall on ground footprint of oil and gas developments (see Figure 38) is less than that of the Mining Industry especially with no tailings from mine put operations but consisting of well sites, facilities, buried pipeline route and access roads and airstrips.

3.11 Invasive Species/Disease

The impacts of invasive species upon local biodiversity is not well reported for Papua New Guinea or its islands. The introduction and spread for example of the Giant African Snail would have impacted upon the native land molluscs but without a baseline of known species, and no study having been made of the impacts this is not known. Non native fish in the Fly, Gulf of Papua rivers and the Sepik have altered the local ecology of these areas. There are many introduced plant species that colonise disturbed forested areas also causing ecological impact. This is true for many introduced species. There is a presence that is having impact but what this is has not been clearly determined due to no study having been done to determine the impacts. Invasive species usually enter through carriage across international border entry points into the country and therefore NAQIA is the agency checking incoming goods. Some however arrive through natural processes.

3.12 Development Access

Where there is access to the environment exploitation is facilitated. The National Government has a plan of development corridors (see Figure 39) that extend beyond the current road network of linking provincial growth centres. If this or other roads are developed it can lead to development along the road corridor. The road itself becomes a barrier to some animal movement. Also roads open up vegetation and can lead to the introduction of invasive species.

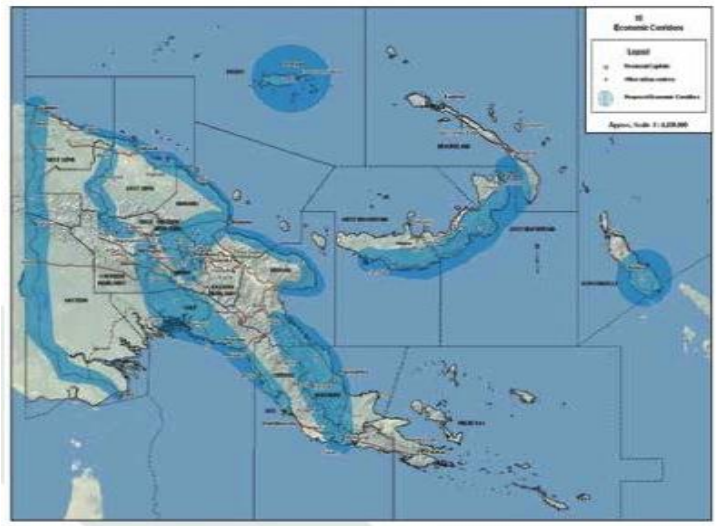


Figure 39. Proposed Development Corridors for Papua New Guinea

3.13 Illegal Export

Currently the illegal export of biodiversity is found under the work of PNG Customs and the National Agriculture and Quarantine Inspection Agency (NAQIA). The Department of Environment and Conservation does not have an electronic database of cases of illegal export. No organized smuggling was detected in this reporting period though unintentional and intentional individual cases occurred.

4 *Business as usual scenario*

Within Papua New Guinea there is a need to recognise our future pathway if the development paradigm moving forward is business-as-usual. We do not need to look far for indicators of where we currently are. In the 2013 Tracking Report of the Millennium Development Goals, Papua New Guinea is *Off track* not only for MDG 7 Environment (see Section 9.3) but every other MDG 1-6 is also *Off track* with some of the worst indicators for the Pacific.

The current Minister for National Planning and Monitoring the Hon Charles Abel in his forward to the *National Strategy for Responsible Sustainable Development for PNG 2014 The Strategy* said

> *If we continue doing as the current DSP suggests, we will have a population of 30 million by 2050, surviving on an economy heavily based on the extractive industries sector and an environment badly damaged by this, and forest and tuna stocks greatly depleted by unsustainable harvesting.*

The Strategy 2014 outlines a future scenario based on the current *Vision 2050* and *Development Strategic Plan 2030* that currently define the development roadmap for the country. The downfall being that they advocate a growth strategy locking the country into a cycle of growth. An exponentially expanding population and need for services whilst negating the seriousness of the finite nature of non-renewable resources and irreversible damage to the environment and ecology. Papua New Guinea recognises the environmental and ecological dangers of pursuing the current model of growth that is largely dependent on the extraction of non-renewable resources and unsustainable us of natural assets.

Land Use, Land-Use Change and Forestry (LULUCF) makes up 95% of Papua New Guinea's current emissions and several sectors have been identified as the main drivers of deforestation and degradation: timber extraction, smallholder agriculture (expansion into forest and shortening of rotation cycle) and commercial agriculture (especially palm oil plantations). Under a Business as usual scenario, all of them will continue to represent the bulk of Papua New Guinea's GHG emissions by 2030.

The new paradigm proposed in the *National Strategy for Responsible Sustainable Development for PNG 2014* elevates and reasserts the ethic that

responsible development means we don't undertake activities that compromise the World's biodiversity or puts our children's future at risk. That the natural ecosystems possess the right to exist, flourish, and evolve therefore continuing vital cycles, structures, functions and processes that sustain communities of PNG who in turn need to protect them.

But as indicated some 20 years ago in the *Report of the UN Joint Inter-Agency Mission to PNG on Sustainable Development 1992*, Agenda for Action, a supportive and enabling system of governance is the cornerstone of a National Sustainable Development Strategy.

Part II NBSAP Implementation and Mainstreaming of Biodiversity

5 *NBSAP Status*

Papua New Guinea has not reviewed the *NBSAP 2007* in part because the department responsible for the environment has been in preparatory transition to a Conservation Environment and Protection agency in recent years.

Within the 4th Report to CBD it was mentioned that the NBSAP of 2007 needed review. That it had essentially not been socialised or followed effectively without sufficient support to implemented. Those outlined were:

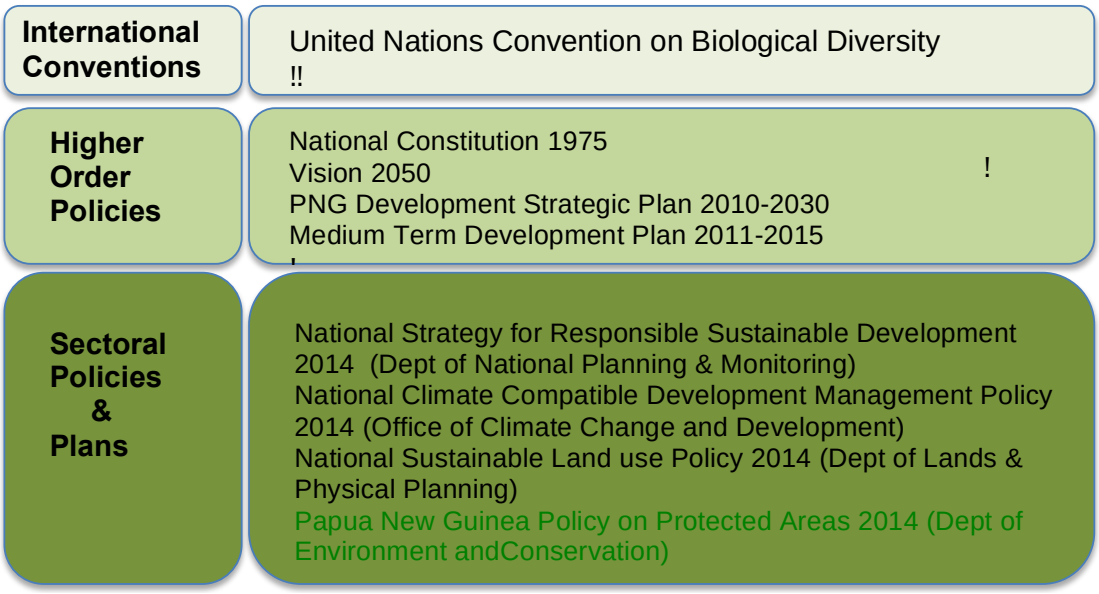
- Articulations and alignment of the national priorities with CBD requirements,
- Formation of an institutional arrangement to coordinate implementation of the NBSAP,
- Development of a national biodiversity conservation policy,
- Improve implementation and resource mobilization strategy for the NBSAP,
- Institute the Biosecurity Act and the Biosafety Policy Framework
- Institute a legal regime to protect intellectual property rights of organizations and individuals involved in biodiversity research and development
- Establishment of partnerships with NGOs, local communities and the donors
- Application of best management practices in Protected area – including the development of Management Plans for Protected Areas
- Limited resources within DEC to support implementation of the NBSAP
- Absence of a sustainable financing mechanism to support conservation work in PNG

Apart from the mainstreaming of biodiversity and ecosystem management and the emergence of a biodiversity offset discussion for sustainable financing the remain ongoing gaps in this reporting period.

Despite the NBSAP not being formally reviewed many policies and plans have progressed the NBSAP through forward thinking.

6 Implementation of Convention

Under the Convention there is a hierarchy of policies and plans within Papua New Guinea with which to effect implementation. The higher order policies are longer term and were initiated at the beginning of this reporting period. The Sectoral policies that relate to the environment and biodiversity are quite recent and are yet to be implemented.



The Department of Environment and Conservation has been in a state of transition towards a Conservation and Environment protection Agency and passed the *Conservation and Environmental Protection Agency Act 2014*.
It maintains a core function to enable the conservation and protection of the environment and activities that help to achieve this. It has strengthened capability to impose and receive changes for its functions under the *Environment Act 2000*.

The CEPA will be overseen by a board lead by the Managing Director of CEPA with membership from the Departments of National Planning, Provincial & Local level Government and of Treasury, and three from the business council including a lawyer and one is a registered public accountant. Thus reflecting its role as an Environmental Protection Agency.

The environment is enshrined in the constitution and there are over 45 various regulations, acts and policies guiding environment issues, yet compliance, enforcement and adherence to standards remain a key challenge. Unsustainable logging operations, direct disposal of tailings, mangrove depletion and unsustainable fishing practices continue to be pressing environmental concerns.

6.1 National Plans

6.1.1 PNG Vision 2050 (2010)

Papua New Guinea developed a *National Strategic Plan 2010-2050* known as *Vision 2050*.

Within this the 6th pillar is on Climate Change and Environmental Sustainability. To develop a Resilient Country using Sustainable Development Measures.

Under this pillar the objectives that relate directly to the environment and biodiversity are to:

- Conserve Biodiversity at the current 5-7% of the world's biodiversity
- Establish a total of 20 national reserves, wilderness areas and national parks
- Establish at least 1,000,000ha of Marine Protected Areas
- Conserve and Preserve Cultural Diversity
- Integrate environmental sustainability and climate change studies in primary, secondary and national high school curricula
- Establish a Sustainable Development Policy in all sectors; especially forestry, agriculture, mining, energy and oceans by 2015.

6.1.2. National Strategy for Responsible Sustainable Development for Papua New Guinea. The Strategy 2014 (Dept of National Planning and Monitoring)

The ideas presented in this document are cited as a Development Revolution. It reviews the Development Strategic Plan *DSP 2010-2030* and subsequent *MTDP 2011-2015*.

Within the paradigm shift towards sustainable development outlined in Figure 40. is that Responsible Development means we don't undertake activities that compromise the world's biodiversity or puts our children's future at risk. It is recognised that PNGs current development pathway is eroding our environmental capital, in a planning cycle that is heading towards a massive population with an equal apatite that will lead to a severely depleted and damaged environment and a new sustainable development paradigm of greening the economy.

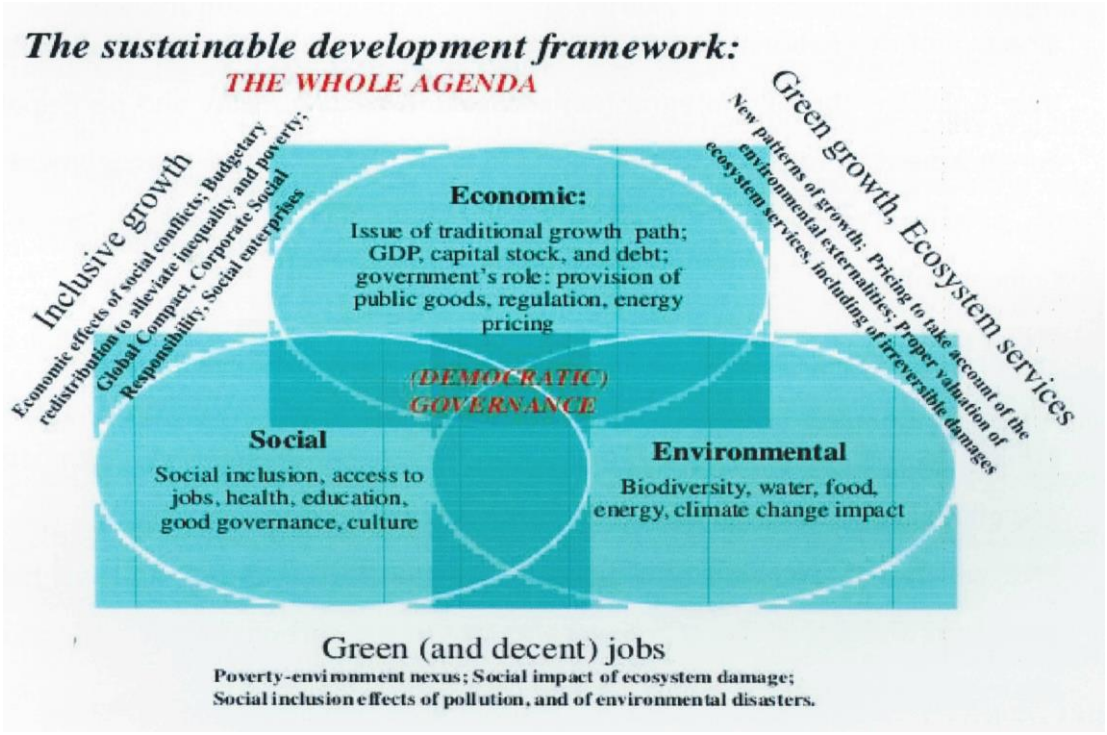


Figure 40. Sustainable development Framework

This green growth will require mechanisms such as:

- A Strategic Environmental Assessment
- Certification of Sustainable Production and Trade.
- Green Accounting/Alternative Development Measures
- Payment for Ecosystem Services
- Environmental Fiscal Reforms
- Green Innovation

PNG's regulatory framework of legislations, institutions and enforcement will be needed to embed green growth and a sustainable development strategy going forward.

This is a document that aims to mainstream green/environmental principals across sectors in Papua New Guinea.

new National strategy in Responsible Sustainable Development

1

6.1.3 PNGDSP 2010-2030 (2010)

The *PNGDSP* also gives emphasis on environmental sustainability and further articulates the Nation's 20 year plan to reach the Millennium Development Goals and targets for the environment. Within the plan a primary goal is to

promote a sustainable environment but recent economic development initiatives have posed new challenges to this.

6.1.4 MTDP (2011-2015)

The first *MTDP 2011-2015* will focus on capacity building and improving legislative frameworks for the environment.

The main challenge faced in this sector is the unavailability of data in some areas and the available but outdated data in other areas.

Biodiversity Data.
In 2013 the DEC in partnership with UNDP held two workshops in Biodiversity Survey and Data Capture, Data Analysis and Species Information Management Methods and Approaches for Application in Papua New Guinea. This was to determine the way forward from the existing SIMS (Species Inventory Management System) database. It was suggested that the Department maintain an internal Biodiversity database that is populated from existing data and from future surveys and Environmental Impact Assessments. This database should be linked with other specialized biodiversity databases in the country such as the PNG Forest Authority database and the Binatang Research Centre database through a user agreement. It was also recommended that the Biodiversity database be a part of a PNG Interface on the Australian, Atlas of Living Australia which had many biodiversity collections from PNG currently publically available within it. This data will be of importance to the new CEPA in the further development of a countrywide biodiversity plan, its evaluation of new Environmental Impact Assessments and in evaluating ongoing biodiversity monitoring of existing major development projects.

The Government will develop a Land Use Planning Scheme to guide the best use of land. This will ensure that the natural environment supporting the diverse culture is protected, that a particular economic activity is suitable for the designated parcel of land, and that there is sustainable economic development.

In the minerals resource sector to double mineral exports, while minimising the adverse impacts on the environment. The government has recognised a policy gap to address this and has in the MTDS stated that, the '*Government's environment policies and regulations will be reviewed to capture relocation, sea-bed mining and downstream processing matters.*' Proper stakeholder consultation will be critical to review existing environmental policies. This is to ensure all parties take ownership of proposed changes that capture current development issues. However, the underlying objective is to protect the environment from damages caused by the mining industry, for example from tailings disposal. The disposal of tailings through riverine systems was debated in 2014 in the review discussions of the Mining Act. Deep Sea tailings disposal and the impact to the deep sea environment from deep sea mining proposals are also openly debated in the public.

Within the MTDS it recognized that the increasing population is placing increased pressure on PNG's environment with its rich natural resources including forestry and fisheries. On small islands, population growth is placing increasing pressure on the environment, calling for better environmental management. Under the Sustainable Development Strategy this is recognized and family planning through the NGO Marie Steppes was initiated in 2014. There is a need to achieve a population growth rate that is sustainable for society, the economy and the environment.

6.2 Policies Adopted

The National Government of PNG has recently developed three key policies in relation to protected areas, sustainable land use and climate change. The development of these policies was initiated in consultation with stakeholders in 2008 (DOLPP), 2010 (OCCES) and 2011 (DEC) respectively. During 2011 however there was political turmoil in PNG, which culminated in the general elections in mid 2012. With a new government in place these policies were again picked up and further developed with their release finalisation in 2014.

3 new National policies in 2014

These are key policies that will fill gaps that previously existed in environmental policy. Having been just released however they are statements of intent and guidelines for future action until such time as they are implemented.

6.2.1 Papua New Guinea Policy on Protected Areas 2014 (Department of Environment and Conservation)

Based on the CBD requirements and activities, the [draft] *PNG Policy on Protected Areas 2014* articulates the CARR principles of comprehensiveness, adequacy, representativeness and resilience as the basis for the development of a national protected area system.

It was recognised by the GovPNG that a policy was needed in Protected Areas at the beginning of this reporting period. A discussion paper on a PA policy was initially released for public discussion by DEC in December 2011. This was followed by consultations in the four regions of PNG in Goroka, Kokopo, Madang and Port Moresby. Following on from these consultations revisions were made by the DEC. This draft led to considerable comment from a range of stakeholders from government, industry, Non Government Organisations and community groups. 2012 was a national election year in Papua New Guinea and the Protected Areas Policy was not further developed until 2013. A new consultative process in the four regions was again done in 2014. A new draft of the Policy was drawn up and released for public comment in August 2014.

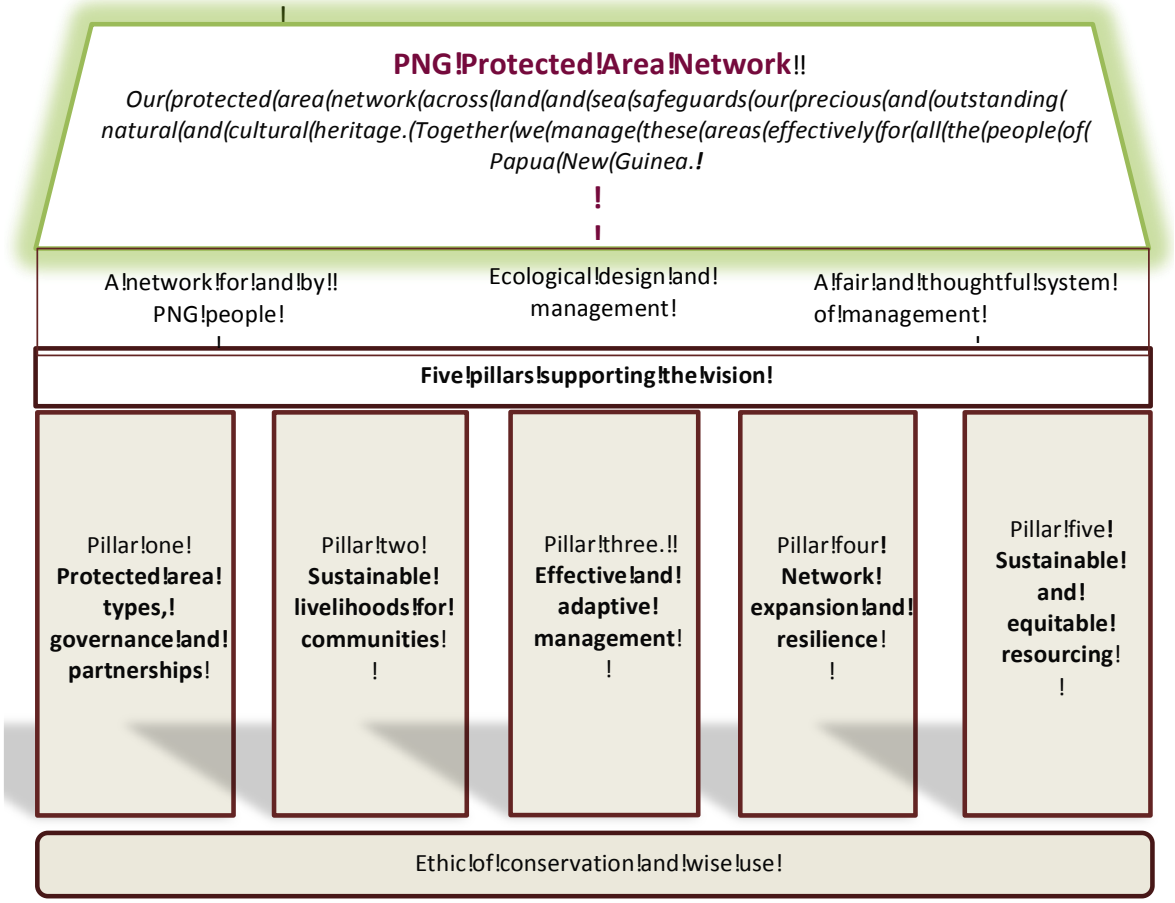


Figure 41. Framework for Papua New Guinea's National Protected Area Network (PNG PA policy)

6.2.2 The National Sustainable Land Use Policy 2014 (Department of Lands and Physical Planning)

The National Sustainable Land Use Policy is a systematic and iterative process in order to create an enabling environment for sustainable development. It assesses the physical, socio-economic, institutional and legal potential and constraints with respect to an optimal and sustainable use of land resources and empowers people to make decisions about how to allocate those resources. The *NSLUP* is an over-arching policy framework that guides the planned allocation, management and best use of land in PNG. It comes under the legislative framework of the *Physical Planning Act 1989* and the *Environment Act 2000*.

Balanced developed is proposed with development promotion the responsibility of Physical Planning and the proposed Sustainable Rural Zone is the shared responsibility of Environment and Conservation and Physical Planning under the over-arching policy framework for sustainable land use.

Social and economic pressures have caused competing land use proposals over land and this is not currently well planned out. This policy proposes for a

national land use planning system to be put into place for the entire country. The Chief Physical Planner to dialogue with relevant agencies/ sectors that have their respective mandated land use plans and facilitate integration of plans.

Within this policy the allocation, management and best use of land lies within three broad land use zones in the country, supported by the existing legislative framework.

The three broad categories, land use zones, that the National Sustainable land Use Policy has identified are for:

- Development Promotion
- Sustainable Rural Development and
- Conservation

The *National Sustainable Land Use Policy* will be implemented through a *Strategic Land Use Plan (SLUP)* that will guide physical development throughout the country. To achieve the goals of sustainable land use practices and balancing rural-urban development, whilst optimizing the use of the countries finite land resources.

Within this policy there is a specific section on Environment and Conservation where conservation areas are identified under the three broad categories of land use. It recognised however, that the existing legislation on the protection of conservation areas needs to be strengthened.

It also recognised that there is environmental degradation and destruction of biological diversity from intensive land usage like resource extraction through logging, mining and commercial agriculture. And that there are a number of resource exploration and development leases which are given over Wildlife Management Areas (WMAs) often causing damage to WMAs through their activities. The rehabilitation, conservation and management of sensitive or critical ecosystems to preserve their integrity, to allow degraded resources to regenerate and to protect human population from environment hazards is critical.

The Department of Lands believes that the *Protected Area Policy* should come under the over-arching policy framework for *National Sustainable Land Use*.

The *National Biodiversity Strategic Action Plan* for Papua New Guinea is seen as the instrument to protect rural areas from the impacts of developments on landscape quality, conservation and enhancement of wildlife species and biological diversity. Therefore there is a need for up-to-date information on the environment characteristics and potential impacts, either positive or negative on the environment should be noted. Recognizing the limit of the environment to sustain new developments without irreversible damages.

Under the current level of national development, current trends of forest harvest most economical forest will have been logged by 2040. Increasing

numbers of rare fauna and flora will become endangered. Some species could be lost forever if exploitation is uncontrolled and habitats altered.

To develop a land use plan is a major challenge as 97% of the land is owned by customary land owners.

Priority Areas for Action

The land use plan should identify certain areas for specific development options, so that each development option such as timber production, climate change and carbon trade, conservation areas and agriculture development activities can continue and be sustained. Achieved through integrated land use plans at the Provincial level.

This will need to be supported by strengthened Laws and compliance in the natural resource and extractive industries in relation to the environment.

6.2.3 The National Climate Compatible Development Management Policy 2014 (Office of Climate Change and Development)

Ecosystems, and forests face adaptive challenges to climate changes and preservation of these systems will required informed management approaches that support transition to a new climate in future.

The Development of a Climate Change Policy in PNG has gone through many iterations until its final release in August 2014. A *National Climate Change Policy Framework* was developed in 2009 followed by stakeholder consultations, which were held in the four regions of PNG in Goroka, Kokopo, Madang and Alotau. These then formed the first consultative draft of the policy put together by the then Office of Climate Change and Environmental Sustainability (OCCES) which produced a draft document for comment *Climate Change Compatible Development for PNG in 2010*. The office was restructured to the Office of Climate Change and Development in 2011 and *A Climate Compatible Development Policy 2013-2015 (draft)* was released in February 2013. This was further revised to what is the current policy document.

The policy recognises that climate change will modify natural systems and that in many cases, these modifications will be significant. For example, rising sea levels will alter the salinity of low lying coastal islands, drought will affect the habitat of many plant and animal species, and rising temperatures will extend the ranges of some species while contracting those of others. These changes will affect food supply, species diversity, timber harvest, and many other important components of the human relationship to the natural world.

As a mitigation of climate change, the majority of Papua New Guinea's emission are derived from land-used, with most of this a result of the forestry sector and clearance for extensive agriculture. This is due to large area over which logging operates in relation to its low population density. There are significant opportunities to reduce emissions from forestry, both by making the

transition to sustainable forest management options and through re-afforestation.

The shift to sustainable forestry with processing into products in Papua New Guinea, and judicious use of international carbon credits to raise incomes and promote development, better forest practices should greatly increase the contribution of forestry to the national economy.

The Department of Environment and Conservation, the PNG Forest Authority, Department of Lands, Department of Agriculture, and Department of National Planning in collaboration with OCCD will support actions that preserve and manage natural assets, including agricultural and forestry lands and natural ecosystems, in such a way that the natural assets can be sustained despite climate change impacts and that the natural assets help reduce greenhouse gas emissions.

Within this policy there are several references to ecosystem level conservation. Through the protection of ecosystem function many aspects of this policy represent cross sectoral statements with climate change as a cross cutting concern to be addressed.

Provincial Cross-sector implementation priorities
Establish a Sustainable Development Policy in all sectors especially, Forestry, Agriculture, Mining, Energy and Oceans. From this to develop provincial priorities in adaptation and mitigation that are in alignment with the National and Provincial programs in these sectors as per the *Vision 2050* and the *MTDP*. These are outlined as follows:

Natural Asset Protection: Protect important natural assets within communities and regions to maintain their roles as "carbon sinks" and to enhance their long-term resilience to climate change impacts. Governments, businesses and institutions of higher learning should help communities identify and map these assets and sustainably manage them.

A Sustainable Land Use Policy is currently being developed that recognizes the threats of climate change to sustainable land use, environment and biodiversity in PNG and highlights the importance of incorporating climate and disaster risk concerns in the land using planning for risk reduction and sustainable development.

Environment: Promoting a sustainable society through the protection and preservation of the natural environment. The PCCIS is aimed at supporting the role of the Provincial Environment Sector in delivering tangible out puts in the provinces. This sector will be relied upon to play a very strong coordination role at the provincial level with the other supporting sectors. The Provincial Environment offices should be able to integrate some of the key issues being raised during the national consultation into their respective planning priorities.

Land and Physical Planning: Promoting Sustainable Land Use in Land Use-Land Use Change and forestry in response to climate change mitigation

The PCCIS intends to support this sector in promoting sustainable land use planning at the provincial level.

Agriculture: Promoting a sustainable and resilient society through food security and sustainable land use for agriculture. This sector will be increasingly impacted by changing weather patterns coupled with intense and frequent weather patterns will greatly affect subsistence security, in terms of agricultural yield and output.

LULUCF Relevant Programs, Projects and Reforms: Support LULUCF emissions reductions by incentivizing initiatives that reduce and sequester GHG emissions, and by dis-incentivizing GHG emitting activities, emphasizing co-benefits from sustainable development, ecosystem conservation, biodiversity protection, community engagement, equitable distribution of benefit through the identification of appropriate carbon ownership rights. A 'no regrets' dual mitigation-adaptation approach will be implemented.

Forestry: Promoting a climate compatible society through forest conservation and sustainable timber harvesting options and to conserve biodiversity at the current 5-7% of the world' s biodiversity.

Establish a total of 20 national reserves, wilderness areas and national parks. The *Provincial Climate Change Implementation Strategy* is aimed at guiding the implementation of potential climate compatible forestry and REDD/+ pilot programs in provinces. It would also look at provincial government support of conservation efforts at the provincial level.

The PNG Forest Authority also complied a *Climate Change Compatible Plan 2010-2015* which contains relevant sections relating to the ecosystems and biodiversity. This will now have to be reviewed following on from the release of the OCCD Policy.

Fisheries: Promoting climate resilience through the protection of marine and fishing zones. The *Provincial Climate Change Implementation Strategy (PCCIS)* will guide the implementation of fisheries activities in the provinces.

6.2.4 National Policy on Traditional Medicine (2007 under review 2014) (Department of Health)

It is recognised within the National Policy on Traditional Medicine 2007 that appropriate measures will be taken to preserve medicine plants Through the identification and taking measures for the cultivation and conservation of Medicinal Plants (GovPNG 2007). This is currently under review in 2014 to take into consideration advances and changes in this important provisioning service from the localised species within ecosystems that provide health benefits to village based communities and primary health care.

6.3 institutions

6.3.1 DEC Corporate Plan 2009-2012

In support to progress the Environmentally Sustainable Economic Growth (ESEG) agenda and the MTDS initiatives, both DEC developed the DEC Corporate Plan (DEC-CP) 2009 – 2012. This was not revised in 2013 in part due to the process of transition of DEC to CEPA. The objectives within the DEC-CP 2009-12 were directed towards the establishment of a new effective department, improved administrative performance, effective implementation of GovPNG's ESEG agenda, improved environmental regulatory processes and demonstrated on-ground improvement in both environment and economic outcomes through implementing large scale pilot projects in partnership with other levels of government and external stakeholders

6.4 Programs/projects

There is considerable support and for biodiversity, environmental conservation and sustainable development through many program and projects. The following is a brief outline of many of these initiatives. Included are the *Aichi Targets* that they each in part contribute towards. Despite these efforts it will be seen that attaining these targets is still an ongoing process. There is a need to better coordinate these efforts and in inter-collaboration in their implementation and results.

6.4.1 Community-based Forest and Coastal Conservation and Resource Management in Papua New Guinea UNDP (GEF-4) 2011-2018

This is a major investment in conservation development in Papua New Guinea. From 2011 to 2014 foundational work has been done on this project in part guided by the implementation of the *Kokoda Initiative,* which is a component that was already being implemented.

The Project Document (ProDoc) outlined a series of barriers to achieving effective sustainable natural resource management and conservation. Effectively articulating a program of work to implement aspects of the *PNG NBSAP* and *Aichi Target* commitments. These are being implemented in the Owen Stanley Ranges and the Island of New Britain but will inform strategy across PNG.

The barriers to effective sustainable natural resource management and conservation. are outlined here along with the primary strategies to overcome these and achieve positive results

1. Inadequate legal and policy structure and a lack of National biodiversity priorities to allow the planning establishment and funding of sustainable protected areas

- Ineffective coordination amongst sectorial institutions for land use planning to incorporate protected areas
- Ineffective and uncoordinated national protected areas policy
- Lack of national conservation criteria
- Inadequate policy and legislation to support payment for environmental service PES schemes
- Inadequate institutional and staff capacity to implement national conservation strategies including protected areas management
- Failure of national strategic planning policies to address population pressures on land degradation and conservation

2. Deficient biodiversity information and data analysis to facilitate conservation needs planning and develop baseline for environmental services
   - Inadequate data for accurate national conservation needs planning
   - Inadequate baseline information to quantify payment for ecosystem service schemes
3. Inadequate economic incentives and variable local capacities to support community conservation areas
   - Lack of economic incentives for community conservation
   - Low capacity for economic development and resource management at the local level
   - Variable types and capacity of local level organisations.

The primary strategies to overcome these identified barriers are to

- Establish a national enabling environment for a community-based sustainable national system of protected areas (PAs) containing globally and nationally significant biodiversity.

This component will focus on improved institutional coordination, consolidated policy and legislation, improved DEC/CEPA staff capacity and development of funding structures to underpin conservation planning.

- Identification and establishment of conservation areas through a structured science-based process.

This component aims to add 1 million hectares to the sustainable national system of PAs through the establishment of new Conservation Areas (CAs) and/or conversion of viable existing Wildlife Management Areas (WMAs) into CAs which can effectively remove current and future pressures for forest degradation and conversion.

Conservation Area management planning and partnership agreements with communities will ensure that CAs are effectively managed according to agreed criteria to maintain biodiversity values. In addition, this component will create the service delivery, community development and economic development outcomes required to compensate community landholders for the opportunity costs of keeping their lands under protection. Integral to this will be the development of sustainable financing plans for each CA; to this end, communities in prospective project sites will be provided with the tools,

resources and capacities to develop conservation-compatible livelihood opportunities in sectors such as PES, tourism, forest monitoring and sustainable agriculture.

Capacity development and support for implementation of CA Management Plans will deliver the training and capacity development tools needed for Provincial, District and Local Level Government officials to help community management groups to deliver improved services, income, planning and education opportunities for communities within and around CAs. This component will also help increase the capacity of landowners and communities to manage the CA and generate income from associated business activities. Finally, this component will also coordinate ongoing monitoring and evaluation of the project.

Although this project is in its initial stages it can be seen within the many recent policies developed, that these are proposing a more coordinated land use planning approach that has clear guidelines towards protected areas. Also how this is relevant to a new sustainable development paradigm that links human wellbeing to the health of the natural environment that is in a dynamic state due to anthropogenic influences.

6.4.2 Kokoda Initiative (2008-2010-2015)

This program has now entered a new phase through the *Second Joint Understanding 2010-2015*. Between Australia and Papua New Guinea this is a continuation of effort towards the progammes vision which is in part fulfilment of the *PNGSP (2010-2030)* and contributing to several of PNG's biodiversity and *Aichi* targets.

The vision of this program is the Sustainable development of the Owen Stanley Ranges, Brown River Catchment and Kokoda Track region and protection of its special natural cultural and historic values.

Within the Interim Protection Zone IPZ of this initiative it has become increasingly recognised that most areas are largely unexplored and many species remain undescribed with desktop studies revealing possibilities in working towards World Heritage Listing. Many of the work streams within the initiative are also regarded as a pilot in processes towards sustainable development and conservation.

The conservation of biodiversity and other values of the Kokoda track and IPZ has led to an integrated program through five main goals.

- The wise use and conservation of the catchment protection area, including the Kokoda Track and its natural and cultural resource and values.

- Biodiversity scoping in surveys, data and data management for surveys, in gaps such as Mt Victoria and in listing invasive species. Capacity development in spatial mapping in environmental management.
- A safe and well managed Kokoda Track, which honours its wartime historical significance and protects and promotes its special values.
- The ongoing development of the effective operation of the Kokoda Track Authority through organisational capacity, a track conservation program and capacity building of rangers and construction of a traditional prototype cane bridge a
- Enhanced quality of life for landowners and communities through improved delivery of basic services, income generation and community development activities.

These goals will be achieved through the development of several programs, which will also be a guide to process for other initiatives in the country through capacity building of PNG based agencies and strategic planning.

Social mapping to better understand communities and their relation to their environment, reviewing methodologies and developing future social monitoring processes.

Health and Education infrastructure improvement, training of health staff, outreach extension, education materials.

Building national and international tourism potential of the Owen Stanley Ranges and Kokoda Track Region, supported by future World Heritage nomination. Collaboration with the Tourism Promotion Authority in accreditation of accommodation and aligning sustainable tourism within provincial plans.

Working with communities, landowners and communities at all levels of government to ensure the activities established under the Kokoda Initiative are sustained into the future.

6.4.3 Multi-purpose National Forest Inventory EU 2013-

This program will contribute to the implementation of PNGs climate change policies and mitigation measures. The purpose of the new project is to support the PNG Forest Authority to implement a continuous and multi-purpose National Forest Inventory. Funds are provided from the Global Climate Change Alliance (GCCA) an initiative of the European Union to strengthen dialogue and cooperation with developing countries most vulnerable to climate change.

The PNG Forest Authority is taking the lead to carry out a multi-purpose forest inventory to improve planning and management of the forestry sector. Specific studies will be implemented in East Sepik and Milne Bay province. The national forest inventory (NFI) will be a key element to contribute to the REDD-plus

initiative, implemented under the United Nations Framework Convention on Climate Change (UNFCCC) mechanism.

6.4.4 Enhancing Forest Law Enforcement in PNG ITTO 2011-

This has worked towards a framework of documents for a *PNG Timber Legality Standard, Industry Code of Conduct* to compliment the *Logging Code of Practice* 1996 and Stakeholder Monitoring Modules.

6.4.5 Lowering Emissions in Asia's Forests LEAF USAID 2011-2015

Within this program there are initiatives to build and institutionalize technical capacity for economic valuation of forest ecosystem services and monitoring changes in forest carbon stocks and to demonstrate innovation in sustainable land management.

This regional approach allows the involved countries to learn from each other and from the project's activities while working to enhance forest carbon storage. Through these efforts, LEAF assists in supporting national preparations for future implementation of an international REDD+ framework.

6.4.6 Biodiversity Offset ExxonMobil – PNG 2013

An objective of the ExxonMobil-PNG *Biodiversity Strategy* is that residual impacts on biodiversity values be appropriately accounted for through an offset program of conservation and rehabilitation measures, guided by good industry practices.

Biodiversity Offset was a requirement of the financiers of the PNG LNG project however Papua New Guinea had no system, formal or otherwise to guide the development of on offset plan. The biodiversity offset plan was therefore developed by the then Esso Highlands Limited, in consultation with stakeholders and institutions.

The *Biodiversity Offset Delivery Plan* was designed through a collaborative process with local stakeholders. It has been based on the criteria for offset, the legal and social framework for conservation and the identified protected areas in Papua New Guinea, along with identified constraints, opportunities and options. The *Biodiversity Offset Delivery Plan* and the biodiversity offset program consists of a series of separate but complimentary components (see Figure 42). Together, these components form a comprehensive program for biodiversity offset that encompasses conservation activities at the local scale through to strengthening existing protected areas and providing new protected area development where possible. These activities are supplementary to initiatives that support conservation and protected area planning at the

landscape (regional) and national levels with the aim of enhancing conservation in Papua New Guinea.

Considering that the detailed design of each component is dependent on prevailing external circumstances at the time of implementation, change, and adaptation to change, are inherent features of the Biodiversity Offset Delivery Plan and the biodiversity offset program.

Figure 42. ExxonMobil PNG Biodiversity Offset Components

Each of these components are being progressively being implemented through ExxonMobil PNGs' support and collaboration with key local stakeholders.

The GovPNG has since made initial reference to apply the concept of biodiversity offset through the *Protected Area Policy 2014*. Stating that where existing industry proposals for resource extraction or development coincide with and conflict with Conservation Priority Areas, biodiversity offsets will be required in similar ecosystem or habitat types. In the case of new proposals, careful consideration would be required and only approved where no nett harm can be ensured. How Biodiversity Offset can be formalized to facilitate conservation of biodiversity and ecosystems, is still under discussion and development within DEC.

Apart from biodiversity offset ExxonMobil PNG has an environment program that was set out during the construction phase, which included; biodiversity and baseline surveys, waste management, pollution prevention and abatement, invasive species control, tracking vegetation regeneration, water management and erosion/sediment control. A Biodiversity Strategy was developed in 2010 and is being implemented along with a Biodiversity Monitoring Program.

Green House Gas emission of the PNG LNG projects in country activities are also calculated on an annual basis.

1 biodiversity offset delivery plan

6.4.7 Mangrove Rehabilitation for Sustainably Managed, Healthy Forests (MARSH) USAID 2013-

The MARSH project's main initiatives include the provision of training for community-based, sustainable mangrove forest management and mangrove reforestation and the strengthening of technical and scientific capacity of local universities and public institutions to conduct forest carbon monitoring, reporting and verification.

In Papua New Guinea, the MARSH project will support the government in achieving the goals cited in the Papua New Guinea *Vision 2050* reducing greenhouse gas emissions by 90 percent, establishing a sustainable development strategy for forests by 2015, increasing resilience to natural disasters and environmental change and supporting the OCCD goal of planting one million mangrove trees by 2016.

6.4.8 Papua New Guinea Marine Program on Coral Reefs, Fisheries and Food Security 2010-2015

This national program was closely tied to the Coral Triangle Initiative and has many initiatives outlined.

- Identification, demarcation, designation and sustainable management of priority seascapes.
- Effective application of an ecosystem approach to management of fisheries (EAFM) and other marine resources.

The approach will look at both food security of local artisanal fishers and well as sustainable commercial fisheries such as tuna. This will need the support of a strong legislative policy and regulatory framework.

- The establishment and effective management of a Marine Protected Areas (MPAs) system.

Networking is a key to achieving this and currently the CLMA network and Learning Training Network have been proactive in information sharing from practitioners across the LMMAs of the country.

- Implementation of climate change adaptation measures to management of the coastal and marine environment.

A current proactive program in PNG is the Coastal Community Adaptation Project C-CAP supported by USAID 2013-2015. Aspects of this are building local adaptive capacity, strengthening resilience, improved coastal zone and water resource management.

- Improved status of identified threatened species including sharks, sea turtles, sea birds, marine mammals, corals, sea grass and mangroves.

Of these species there is a proactive program on mangrove rehabilitation with support from the USAID Mangrove Rehabilitation for Sustainably-Managed Healthy Forests (MARSH) Project from 2013-2017. The MARSH project activities include training for community-based, sustainable mangrove forest

management and mangrove reforestation and strengthening technical and scientific capacity of PNG universities and public institutions to conduct forest carbon monitoring, reporting and verification.

The *Fisheries Management Act 1998* also stipulates that each management plan is to include certain elements, including the objectives to be achieved in the management of the concerned fishery. The management objectives are a prominent feature of all current PNG management plans. As an example, the *National Shark Longline Management Plan* gives the following management objectives:

> To apply a precautionary approach to the management of the shark fishery, ensuring the harvest of shark resources is sustainable and that shark fishing has minimal impact on the marine ecosystem. To ensure that there are benefits to Papua New Guinea from the sustainable use of its shark resource. To ensure that the utilization of the shark resource does not have negative impacts on coastal communities.

Many local NGOs are also proactive in dugong and turtle awareness. There are also some doing e turtle tagging and monitoring, supported through SPREP.

PNG is a party to the *Nauru agreement* in relation to the multispecies tuna fishery. In 2010 decisions were made to prohibit setting purse-seine nets around whale sharks, a ban on fishing near fish aggregation devices during the months of July through September. In December 2011, the PNA purse-seine free-school skipjack fishery was certified under the Marine Stewardship Council standards as being sustainable. Whilst in 2013 saw the establishment of a PNA Observer Agency to improve efficiency of national observer programmes in maintaining 100% independent observer coverage aboard purse-seine fishing vessels in PNA waters;

6.4.9 Coral Triangle Initiative and CTSP 2011-2014-

Coral Triangle Support Program

This initiative was to support Papua New Guinea's National CTI actions in integrated marine and coastal management in the Coral Triangle. It represented a collaborative effort between the implementing partners (World Wildlife Fund (WWF), The Nature Conservancy (TNC), Conservation International (CI), with the GovPNG agencies.

There are modest indications that social ecological conditions are improving in the LMMAs across the country from this initiative.

This was from the extension to communities of capacity in Local Marine Management Areas (LMMAs), Ecosystem Approach to Fisheries Management (EAFM), Climate Change Adaptation (CCA) planning and implementation are progressing, with the greatest tangible progress on LMMAs at the local level whilst EAFM and CCA concepts are diffusing among policy makers.

Manus Provincial government Environment Sustainable Development Plan (ESDP) 2010-2015 was developed and implemented in collaboration with stakeholders.
A feasibility study of Payments for Ecosystems Services (PES) focused on the Lorengau Watershed and catchment area in Manus province. The study is guiding approaches to integrate PES into adaptation plans and programs at the local and provincial level.
PNG's Centre for Locally Managed Areas (PNG-CLMA) became the lead coordinating organization for marine learning and training activities in PNG which will be coordinated through hubs. This supported the *Manus Environment Conservation Communities Network (MECCN)* the first learning network established in PNG.

2. Ecosystem Approach to Management of Fisheries (EAFM) and Other Marine Resources Fully Applied
The US CTI Support Program has:

- Improved the management of 15,000 hectares of marine protected areas.
- Improved the coastal, fisheries and natural resource management of over 250,000 hectares.

3. Marine Protected Areas (MPAs) Established and Effectively Managed

- The CTSP assisted in the development of the PNG and Coral Triangle Marine Protected Area System through integration of EAFM and CCA concepts into community management plans. The community of Pere with the *Pere Alalau Association* reviewed incorporated these into its updated LMMA management plans. launched in summer 2012. Several Manus communities are in the process of developing similar plans.

4. Climate Change Adaptation Measures Achieved

- Support in the building upon traditional knowledge in Papua New Guinea to improve scientific understanding of climate change and further incorporation into the design and development of climate-resilient LMMAs.

Kulungi, Lolobau and Tarobi LMMAs are priority development sites within the PNG region of the Coral Triangle.

The development of a broad range of well-designed educational materials and guidebooks also represents an opportunity for the next stages of US government and international NGO support for the CTI-CFF in partnership

Papua New Guinea ratified the Permanent Secretariat 2014

6.4.10 Marine Turtle and Dugong Awareness Program for Western Province 2010-

Treaty community representatives had been developing a *Marine Turtle and Dugong Management Plan* for the PNG region under the Australian

Government funded PNG Engagement Project. The 'Guiding Framework' *is a* seven-point plan that addresses the impacts of unsustainable practices relating to marine turtle and dugong harvests in the PNG sector of the Torres Strait and provides a package of actions to address local, regional and national or international management needs.

6.4.11 Strategic Program on Climate Resilience ADB 2012-2017

This is in the project preparatory stage currently, with a recent scoping visit to Papua New Guinea in September 2014. It is there preemptive to report on progress.

The goal of the SPCR is to help PNG transform to a climate resilient development path. To build climate resilient communities by strengthening capacity to address priority climate change risks consistent with national poverty reduction and sustainable development goals of the *Vision 2050*, *Development Strategy Plan (DSP), Medium Term Development Plan (MTDP), Public Investment Plan (PIP)* and *Climate Compatible Development Strategy (CCDS)*. Through an increased application of knowledge on integration of climate resilience into development.

In the project preparatory phase OCCD has done vulnerability profiles and capacity assessments at selected site to inform future strategy
The following components that are of direct relevance to ecosystems and biodiversity outlined with in the Initial Project Inception Report are:
1. Building Climate Resilient Communities

- Climate change vulnerability mapping and adaptation planning
- Pilot activities to determine the best mechanisms to address climate change health risks related to increases in water and vector-borne disease.
- Capacity Building in Climate Change Risks Management

2. Addressing climate change risks to food security.

- Establish ecosystem- based climate resilient fisheries management in pilot vulnerable communities

6.4.12 Coastal Community Adaptation Project C-CAP USAID 2013-

Aims to build the resilience of vulnerable coastal communities in the Pacific region including PNG to withstand more intense and frequent weather events and ecosystem degradation in the short term, and sea level rise in the long term.

Integrating climate resilient policies and practices into long-term land use plans. This involves community/risk mapping exercises to review risk to projected climate impacts and support land use planning exercises, scaling up plans to provincial and national government and to implement nature-based infrastructure activities when appropriate (mangrove reforestation, erosion control

6.4.13 Pacific American Climate Fund USAID 2014-

Is a fund to strengthen the resiliency of vulnerable communities in Pacific island countries including PNG to adapt to the negative impacts of climate change.

6.4.14 World Wide Fund for Nature WWF

Terrestrial Projects

Wildlife studies and land use planning/management in the Kikori River Basin and Upper Sepik, cross-border cooperation in the TransFly ecoregion,
The establishment of the Lake Kutubu WMA and RAMSAR site. Technical Support to DEC in 2012 in nomination draft for the Sepik Wetlands (2.44 million ha) RAMSAR site.

Marine Projects

Development of LMMAs on the northern coast of PNG through the CTI program.

6.4.15 The Nature Conservancy TNC

Terrestrial Projects

Development of a Conservation Area within the lower montane forest of the Adelbert Mountains of the Madang Province in collaboration with the Adelberts Conservation Cooperative Society. First Fair trade-certified cocoa in the country. Technical support for the Madang Sustainable Development: Ridges to Reefs Gap and Priority Analysis 2013.

Marine Projects

LMMA establishment in Kimbe Bay West New Britain province and Manus Province through the CTI and CTSP programs. Development of PNG PoWPA 2009 and further refinement. Assistance in the development of PNG Marine PoWPA 2013.

6.4.16 Conservation International CI

Terrestrial

Reviewed the ExxonMobil PNG Biodiversity Offset program 2011, reviewed the EIA of Woodlark Mine 2013 and did the second P'nyang Biodiversity Rapid assessment in 2013.

Marine

Awareness in marine ecology, with the development of marine management plans, preliminary LMMAs in island communities (Nuakata, Iabam-Pahilele, Wialoki and Ware) of Milne Bay. Monitoring of management results through the CTSP program.

6.4.17 Wildlife Conservation Society WCS

Terrestrial

REDD+ pilot survey in Manus. Biodiversity assessment of the Hindenberg Wall in 2013.

Marine

Awareness in marine ecology, with the development of marine management plans, preliminary LMMAs in Manus and New Ireland communities.

6.4.18 Partners With Melanesians

Development of the *Managalas Conservation Area Project (MCAP)* 300,000 hectares of diverse vegetation located, between the Owen Stanley and the Sibium Range which contains the upland population of the Endangered Queen Alexandra Birdwing Butterfly. This CA was advertised for public review or acceptance and is responding to critical comment.

6.4.19 The Centre for Environmental Law and Community Rights CELCOR Inc

CELCOR offers affordable legal assistance and advocacy for Papua New Guinean customary land owners in Environmental concerns. The vision, mission and main objectives of the organisation have remained relatively consistent.

6.4.20 Centre for Locally Managed Areas CLMA Inc

CLMA developed collaboration between PNG LMMAs with capacity building and the development of a learning training network.

6.4.21 PNG Ecoforestry Forum EFF

The umbrella PNG Ecoforestry Forum has been proactive in REDD+, timber certification support and in education, empowerment and advocacy. It is developing a database information hub in 2013 of its 15 members activities.

6.4.22 Binatang Research Institute

This institution based in Madang looks at plant insect interactions building up ecological knowledge. This includes the capacity building of local university graduates in collaboration with overseas researchers but also equally important the collaboration with local para-ecologists from within communities.

6.4.23 Institute of Biological Research

IBR was founded in 2008 by a group of local scientific colleagues dedicated to conserving Papua New Guinea's flora, fauna and ecosystems to ensure a biologically sustainable future. They conduct research, train PNG biologists and conservationists, ensure information is shared with policy makers, landowners and PNG citizens, and integrate traditional knowledge & customs with modern concepts of conservation

6.4.24 Tree Kangaroo Conservation Program

In 2013 TKCP established TKCP-PNG, the local implementing NGO to manage the YUS Conservation Area. This program envisions a sustainable, healthy, and resilient Huon Peninsula landscape which supports the area's unique biodiversity, human communities, and culture. Whilst the TKCP at Woodland Park Zoo is the international conservation program, focused on conserving the endangered Matschie's tree kangaroo and its habitat. Due to their biological and cultural importance, tree kangaroos remain the program's flagship species but conservation also includes habitat for a wide range of threatened species. Conservation is supported by a Trust fund for management and through landscape planning and local livelihood initiatives.

7 Outcomes Achieved

7.1 Mainstreaming Biodiversity

Marine PoWPA Conservation Planning

Following the Terrestrial PoWPA reported in the PNG's 4th Report to CBD the Department of Environment and Conservation is currently undertaking a national marine gap analysis to contribute towards their commitment under the Convention on Biological Diversity to establish a "comprehensive, effectively managed and ecologically-representative national system of protected areas." The gap analysis will identify conservation priorities throughout Papua New Guinea's marine area to inform protected area planning, environmental impact assessment and other biodiversity conservation interventions.

With assistance from the Australian Government, The Nature Conservancy, CSIRO and the University of Queensland, DEC is currently undertaking a national marine gap analysis aimed at identifying and addressing ecological gaps in their marine protected area (MPA) system, and identifying areas of conservation interest for protected area planning, environmental impact assessment and other management and conservation activities.

Initially a regionalisation to classify the large and diverse marine environment of PNG into different regions so that CARR principles could be applied to the gap analysis. The ecoregions and bioregions defined in Figure X were used as stratification units to apply these CARR principles in the PNG National Gap Analysis, where these principles will be applied to:

- Deep water habitats based on ecoregions; and
- Shallow water habitats based on bioregions.

This is because the delineation of shallow water habitats was based primarily on characteristics of shallow water ecosystems (particularly coral reefs), so they are not applicable to deepwater habitats.

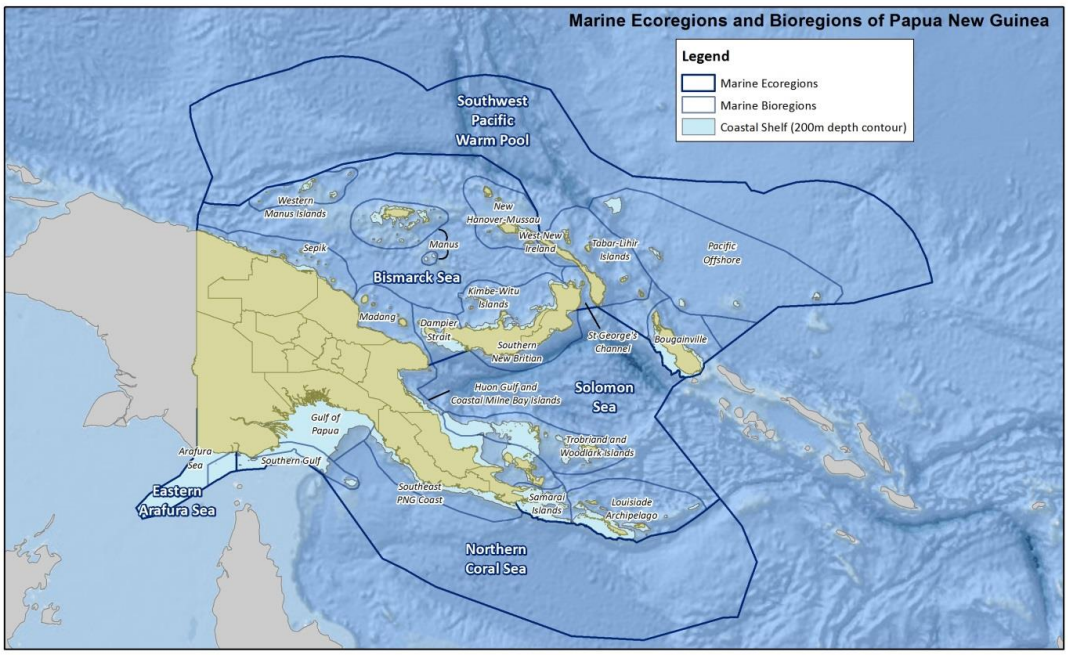


Figure 43. Papua New Guinea EEZ, ecoregions and bioregions

Following on from regionalisation a series of targets were chosen for analysis through the Marxan software planning tool. Several iterations of this were run and the Map in Figure X is one of these. The targets that this shows is Local Marine Managed Areas Habitats 10% Species 20% Spawning Aggregation Sites 50% and costs of distance to port and Fish Landings Cost. Selected for representativeness for each Bioregion stratification.

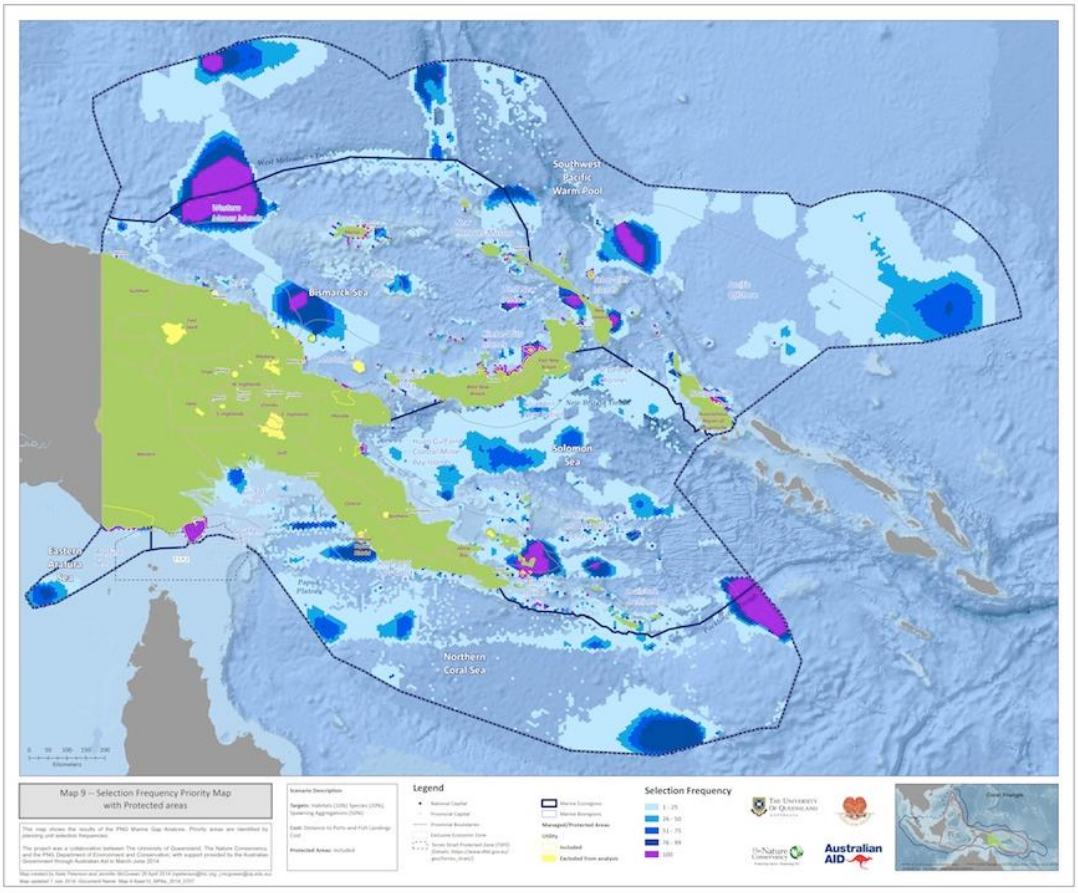


Figure 44. PNG Marine PoWPA Selection Frequency Priority Map, showing Terrestrial Protected Areas, Local Marine Managed Areas Habitats 10% Species 20% Spawning Aggregation Sites 50% and costs of distance to port and Fish Landings Cost. Selected for representativeness for each Bioregion stratification.

The preliminary Marine PoWPA process and verification process with products of this and other maps was done in mid 2014 with stakeholders and was in fulfillment of the *CBD Program of Work on Protected Areas (PoWPA) Action 1.1.5: complete protected area gap analyses at national and regional levels based on the requirements for representative systems of protected areas that adequately conserve terrestrial, marine and inland water biodiversity and ecosystems.*

The PoWPA process of planning towards an affective protected areas system is also in fulfillment of the first goal of the PNG Marine Program. DEC is also working towards a combined terrestrial and marine PoWPA so that a holistic ridge-to-reef-to-deep-sea, conservation and natural resource management plan is articulated for the first time.

Terrestrial & Marine PoWPA in place

7.2 Biodiversity Integration into Planning Processes

The Department of Environment and Conservation has strengthened its capacity and independent evaluation of Environmental Impact Assessments as

required under the *Conservation Act 2000*. Major developments such as mines broadscale agriculture and development corridors require EIA/SIAs which also have a Social Impact Assessment. Apart from the developer submitting an EIA for consideration it also pays for an Independent review of this through DEC to a qualified consultancy. DEC needs to further develop its database and technical capacity so that it can make informed comments on EIA in the process towards the issuance of an Environmental Permit. This will be a core function of the CEPA.

The National Lands Department, Minerals Resources Authority and Forest Authority have spatial capacity and the current Protected Areas have been recognised in their maps. Protected areas are therefore referenced in Land Use planning and zoning, the issuance of Exploration Licences, Forest Management Areas and Logging Plans respectively. This is a recent development of the integration of environmental plans in the development agencies. With a PNG biodiversity plan informed by PoWPA mapping it is anticipated that priority areas for conservation currently not under protection will also be considered in any development planning. This is currently lacking for PNG.

8 NBSAP Implementation

The following tables are the main sections and objectives within the Current *PNG NBSAP 2007*. As mentioned it was recognised early within its implementation that this needed revision to reflect the changes within country but this has not yet been done. In part due to the line Department of Environment and Conservation being in a state of eminent transition to a CEPA during this reporting period.

Tables Colour Code

In this and in following tables the colour code can be interpreted as
red (not achieved/off target),
orange (variable achievement/mixed) and
green (on target).

Table 4. Achievement of PNG NBSAP to date

1. Policy, Legislation and Administration		
Establish the NCC, expand mandate beyond advisory role and establish a NBSAP Coordination Sub-committee		NCC & Environment Council set out within CEPA Act
Review the functions of PINBio immediately to strengthen biodiversity conservation programs		PINBio no longer is an active body.
An effective legal framework for the implementation of the CBD and related Conventions		CEPA Act 2014 now in place. Environment Laws to be reviewed following establishment of CEPA
Develop innovative policy and law that protect the intellectual property rights of organizations and individuals engaged in biodiversity research and development		IPR WS discussions held and still being developed
Improved effectiveness of existing legal mechanisms by creating greater awareness of conservation regulations and enhancing the capacity of law enforcement agencies (including the police, customs, airlines and NAQIA).		Surveillance remains a core activity of these line agencies who collaborate with DEC

2. Financial and Technical Resource		
To develop the human capacity to ensure the short- and long-term financing and sustainability of NBSAP		Capacity building within DEC
To design and implement a spectrum of sustainable financing mechanisms for NBSAP implementation		Within CEPA Act and plan
Obtain necessary financial support for biodiversity initiatives		CTI, GEF4, GEF5 ProDoc
Encourage local investment in biodiversity conservation as a complementing measure to foreign donor support		Industry funding Government co-financing
Expenditure reduction through reduction of duplication of effort, streamlining activities, and strategic actions to ensure maximum mileage from minimum investment by the Biodiversity Projects Coordinator.		No specific actions on this

3. Human Resources and Institutional Capacity Building		
Enhance the administration, planning and mobilizing funding and technical resources for the implementation of NBSAP		Is a part of the DEC work-plan
Better coordination of the required policy, legal, scientific and economics work		Within Policy section of DEC & through *ad hoc* Technical Working Groups
Enhance capacity as implementer, coordinator, delegator, mobiliser and motivator of stakeholders (i.e. helping them to help implement NBSAP)		Primary recurrent function of DEC and the C of CEPA.
Strengthening human capacity in Biodiversity Conservation and Management		UPNG program development but is an ongoing process also other tertiary institutions
Strengthen existing partnerships that promote biodiversity conservation and sustainable use of biological resources		Continuing biodiversity surveys with overseas institutions
Identify new partnerships to encourage biodiversity conservation and sustainable use of biological resources.		Bilateral, NGO & Industry partnerships well developed
Devise programs that promote greater collaboration		*Ad hoc* Technical Working Groups
Introduce better mechanisms for stronger coordination		As above
Source funds to strengthen partnership collaboration		CTI, GEF4, GEF5
Develop stronger partnerships with provincial and local-level governments		The structures and linkages of National DEC and Provincial Administration remains *ad hoc*
Develop programs to build stronger partnerships with local communities		Specific projects are built upon this as a standard practice

4. Benefit sharing		
To upgrade national legislation to enable the protection of intellectual property on biodiversity and to promote the use of prior informed consent in the granting and obtaining of access to biodiversity and knowledge of biodiversity.		Cultural Properties Act 1991 still under review. IPR in relation to traditional environmental knowledge poor
Ensure benefits arising out of genetic and ecosystems resources use promote sustainable rural development		Genetic No. Payment for Ecosystem services REDD+ still being discussed
Genetic and ecosystems to be harnessed for the development of agricultural products to ensure food security		NARI has genetic material collections as part of farm systems research. Needs greater support.
Genetic and ecosystems to be harnessed for the development of pharmaceuticals products that support human health.		Bio-prospecting not currently actively developed.

5. Research and Information on Biodiversity		
To ensure timely availability and access by all to biodiversity information		SIMS database exists but National Biodiversity Information System database yet to be fully developed and populated
Establish national needs and priorities for biodiversity inventory and research		WS on biodiversity data 2013 DEC follow-up 2014

Develop sub-projects for the prioritized national needs of biodiversity research		
Secure funding and research bodies to implement sub-projects		
Strengthen capacities of locally based institutions and Papua New Guineans in biological research and development.		Ongoing government commitment
Vulnerability due to climate variability and climate change		Climate Change Vulnerability Map NARI
Adaptation strategies for biodiversity.		OCCD within Policy 2014.
Sustainable land-use strategies		National Sustainable Land Use Policy DOLPP Sep 2014
Prevention and control of desertification.		Mangrove and some forest rehabilitation
To develop the capacity to use genetic technologies to characterise PNG biodiversity and aid monitoring of illegal trade		Beyond current capability

6. *In situ* and *ex situ* Biodiversity Conservation		
Review the current national protected areas system in PNG		NBSAP done, full review will be done under CEPA
Empower local communities and promote the full and active participation of landowners in biodiversity conservation programs		Localized projects NGO led
Increase the number of protected areas to ten percent by 2010		PAs area remained static pending CEPA and PA Policy 2014 implementation
Rehabilitate and encourage better management of existing protected areas		As above
Develop a national conservation/ protected areas policy		Completed September 2014
Design and utilize methodologies and indicators for monitoring and evaluating impacts Strengthen ex-situ programmes and their contribution to biodiversity conservation		Interrelationships between overseas Zoos and *in situ* conservation initiatives especially for tree kangaroos
To document all *ex situ* conservation activities currently being pursued		Not documented
To develop a cohesive national network involving agencies engaged in *ex situ* conservation		Above action is a precursor to this activity
Select priorities in the light of PNG's specific cultural and social context.		Undeveloped concept
Develop demonstration projects to test selected priorities		Both Terrestrial and Marine Projects experiences have been shared, some within Learning Training Networks (marine)
Develop regional (watershed/provincial) conservation programmes to integrate conservation activities and protected area management with regional (watershed/provincial) land use planning.		Catchments for Port Moresby are developing this. Some provinces only.
Enhance the capacity of local communities and NGOs to conserve, manage, and sustainably use biodiversity.		All conservation work this is a foundational component but not all communities are reached
Ensure that protected areas and adjacent buffer zones are treated as a single planning unit. Of particular importance in this regard, is to support implementation of an integrated coastal zone management (ICZM) plan for the entire coast of PNG		Not implemented as outlined. ICZM still a concept
Protect native species and habitats		Ongoing priority activity
Linking development activities and EIA (application of EIA for resource management)		The EIA process has been strengthened through both DEC and Independent Evaluation process

The results of the current NBSAP have been mixed. The development of Policy and Sustainable Development Strategy being well supported late in this reporting period. Capacity Building at different levels and the building of

partnerships has also been done well. However this has not been sufficient to maintain or improve the status of biodiversity overall across the country.

Part III Progress towards the 2020 Aichi Biodiversity Targets and contributions to the relevant 2015 targets of the Millennium Development Goals

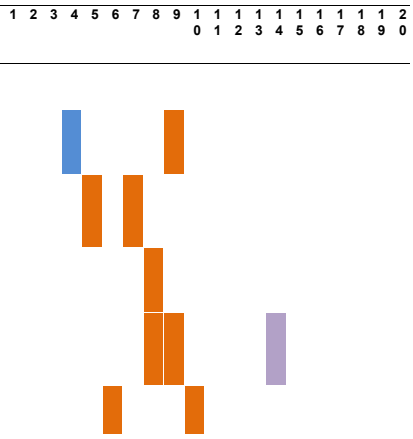
9 *Progress Outlines*

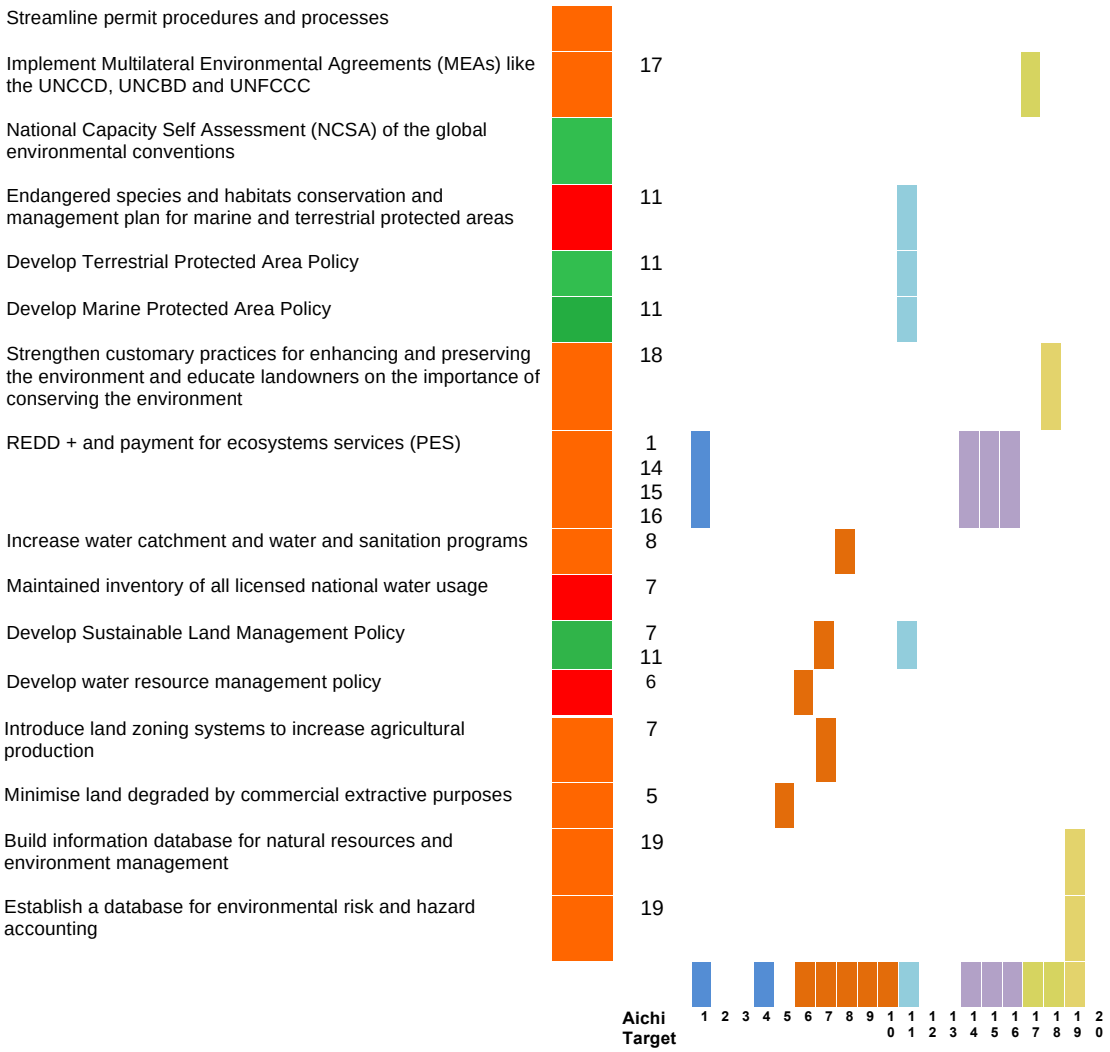
9.1 Progress of PNG towards the implementation of the Strategic Plan for Biodiversity 2011-2020 and its Aichi Biodiversity Targets

The following Table 5 outlines which of the environmental actions within the PNG Development Strategic Plan relate to Aichi Targets and the level of current implementation of these. This is the existing plan that guides the development of the government. It is also a guide to the level of integration of environmental concerns across stakeholders.

Table 5. Achievement of DSP to date and links to Aichi Targets

DSP 2010-2030	Impl. score	Aichi Target
Develop and implement the ESEG policy		!
Develop environment and natural resource development plan for Economic Corridors		4 9
Comprehensive range of natural resource management guidelines that addresses drivers of deforestation		5 7
Waste management policies and guidelines for mining and petroleum projects operations and closure		8
Enhance management of land degraded by commercial extraction		8 9 14
Enhance the coastal zone conservation management plan		6 10
Review of the Environmental Act 2000 and new legislation to create EPA		
Ensure more comprehensive waste management practices are employed		8
Streamline EPA monitoring and compliance and build capacity		
Standards and code of practices for projects category 1 and 2		





9.2 Progress towards the Aichi Targets an overview

The next table outlines each *Aichi Target* in full and a statement of progress towards its achievement. PNG does not have any explicit internal targets apart from the NBSAP that are recognised by the CBD and therefore the *Aichi Targets* are a primary target to report against.

Table 6. Achievement of Aichi Targets to date

Aichi Targets		comments
Strategic Goal B		
Target 10	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.	Under the CTI/CTSP a series of LMMAs have been established across PNG. These are far short of the marine conservation target.

Strategic Goal E		
Target 16	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.	Not developed in PNG
Target 17	By **2015** each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.	The NBSAP of 2007 has not been revised. It will be revised under the new CEPA 2015/16. Policies that will assist in implementation are all dated 2014 and yet to start being implemented.
Strategic Goal A Address the underlying causes of Biodiversity loss by mainstreaming biodiversity across government and society		
Target 1	By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.	Communities do not properly know values of biodiversity. Is known intrinsically but not empirically.
Target 2	By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.	Biodiversity and Ecosystem Values are not currently part of National Accounting. This could change if National Sustainable development strategy is implemented
Target 3	By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.	
Target 4	By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.	With increasing population the subsistence sector can not be sustained. Current rates of logging can not be sustained. Tuna is at TAC and will need regulation to be sustained. Mining continues to cause environmental damage.
Strategic Goal B Reduce the direct pressure on biodiversity and promote sustainable use		

Target 5	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.	Logging and subsistence agriculture continue to cause degradation of rainforest
Target 6	By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.	Currently Tuna are near TAC BDM total ban in place in current reporting period to allow stocks to regenerate
Target 7	By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.	Subsistence Agriculture is currently sustainable but becoming less sustainable in some areas Forests have a determined sustainable rate of cut that is being exceeded
Target 8	By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.	Mine tailings causing major environmental damage. Runoff from urban areas poorly contained. No proper disposal of toxic or e waste. Runoff from agroindustry monitored only
Target 9	By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.	NAQIA has an ongoing invasive species capacity building of staff. Priority Species are controlled in development projects e.g. mines but not other areas
Strategic Goal C Improve the status of biodiversity by safeguarding ecosystems species and genetic diversity		
Target 11	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.	Current rates of areas conserved is not on track to reach these targets
Target 12	By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.	Some species have improved status whilst others have become more threatened

Target 13	By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.	Agricultural diversity is passively maintained by the 80% of the population who are reliant on subsistence agriculture. Not catalogued. Wild varieties passively maintained in their habitat but not formally conserved. NARI maintains some genetic material at research facilities.
Strategic Goal D Enhance the benefits to all from biodiversity and ecosystem services		
Target 14	By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.	Provisioning ecosystems are not safeguarded. Minority groups environmental links and need are not well documented.
Target 15	By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.	PNGFA is currently defining 2 carbon REDD+ projects in Forest Management Areas. Some mangrove areas being initially rehabilitated.
Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building		
Target 18	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.	Traditional Environmental Knowledge is being maintained to some degree by clans and communities. It is however being eroded over time through a lack of formal recognition of its worth. Many developments do not properly gain consensus and over rule traditional use of natural resources.
Target 19	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.	This is currently not being proactively done. Ongoing monitoring by developments if interpreted may give some information relating to biodiversity and trends.

Target 20	By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan 2011-2020 from all sources and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization should increase substantially from the current levels. This target will be subject to changes contingent to resources needs assessments to be developed and reported by Parties.	Government funding allocation currently inadequate. Many funds are being accessed through bilateral aid and by NGO partners. Industry is also funding biodiversity initiatives. This has to be better understood and coordinated.

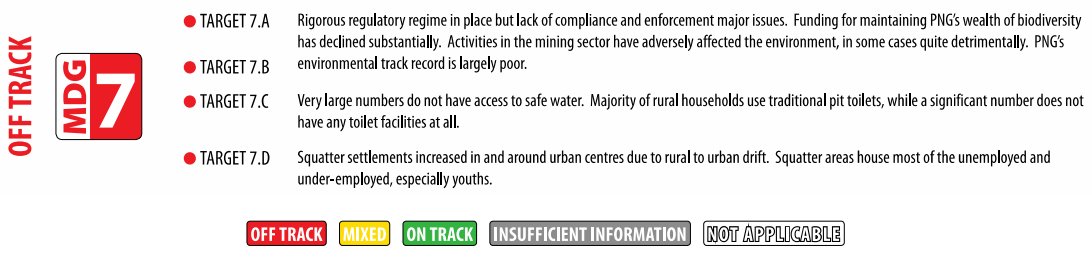
9.3 Progress Towards the Millennium Development Goal 7

MDG GOAL 7 : *Ensure environmental sustainability The environment provides goods and services that sustain human development so we must ensure that development sustains the environment. Better natural resource management increases the income and nutrition of poor people.*

			Baseline	Mid-point	Latest
MDG 7	7.1	Proportion of land area covered by forest (%)	69.6(1990)	66.5(2000)	63.4(2010)
	7.2a	CO_2 emissions, total ('000 metric tons)	2142.0(1990)	2688.0(2000)	3480.0(2009)
	7.2b	CO_2 emissions, per capita (metric tons)	0.5(1990)	0.5(2000)	0.5(2009)
	7.2c	CO_2 emissions, per $1 GDP (PPP) (kg)	0.2(1990)	0.3(2000)	0.1(2009)
	7.3	Use of ODS (ODP metric tons)	28.5(1991)	52.0(2000)	3.3(2010)
	7.4	Fish stocks within safe biological limits (%)	…	…	…
	7.5	Total water resources used (%)	…	0.0(2000)	…
	7.6	Protected terrestrial and marine areas (%)	0.9(1990)	1.4(2000)	1.4(2010)
	7.7	Species threatened with extinction (%)	…	…	…
	7.8	Using an improved drinking water source (%)	33.0(1990)	35.0(2000)	40.0(2011)
	7.9	Using an improved sanitation facility (%)	20.0(1990)	19.0(2000)	19.0(2011)
	7.10	Urban population living in slums (%)	…	…	…

Figure 45. MDG 7 Statistics from MDG 2013 Report

Table 7. MDG 7 Status 2013



The Reporting of the Millennium Development Goal 7 further reinforces the findings of this report. Target 7.A is clearly linked to biodiversity and highlights the need for funding support, regulation and compliance. The transition to the

CEPA is one initiative in achieving this but sectors that impact the environment must also ensure that regulations safeguard the environment and that these are followed up with compliance mechanisms.

10 Lessons learnt from the implementation of the Convention in Papua New Guinea

10.1 Areas where achievements have been made

The major achievements in this reporting period is the development of an overarching *Responsible Sustainable Development Strategy 2014* that recognises that a new development paradigm is needed for Papua New Guinea. It recognises that the current development pathway that PNG is on is eroding our environmental assets, that we are caught in a cycle of demand from a growing population, of profits and growth policies which are undermining a sustainable future.

Nested within this new direction a series of Policies have been developed that directly relate to sustainable land use, protected area development and climate change. Each of these policies outline processes and mechanisms to socialise for their implementation.

For the planning of biodiversity conservation as a country the GovPNG needs to now combine the Terrestrial PoWPA and Marine PoWPA analysis based on currently known biodiversity. This would be a ridge-to-reef-to-deep-sea analysis that takes into account sound environmental, evolutionary and ecological principles, opportunities and threats, within the socio-economic context of PNG. This would then be a guide for strategic cost effective actions towards conservation initiatives.

There are biodiversity conservation projects across PNG that have made a positive impact on species, their habitat and the management of the environment through land owner involvement and action.

Getting back on track

In this way PNG and its government agencies are now better placed to move forward and get our targets on biodiversity within the *Aichi Targets* and *MDG 7* back on track in a coordinated effort.

A matrix of all conservation initiatives across PNG by all stakeholders that indicates which Aichi targets they contribute to, is a possible starting point. Determining what are the extra efforts required to achieve these targets by 2020 needs to be then clearly defined.

10.2 Areas where progress is lacking and where challenges are encountered

The lack of progress towards the Millenium Development Goals within PNG is stark.

The challenge is to have all enabling requirements in place. These include; a vision, political will, law/compliance, policy, strategy, financial commitment and support, an effective implementing agency and mechanism, with stakeholder support.

10.3 Suggested Actions to get back on track.

NBSAP revision linked to sustainable development paradigm
The first action is to revise the *PNG NBSAP 2007* taking into account the changes in policy and the current state of implementation, ensuring that all are considered and linked to the Aichi and future MDG targets and the countries' new direction under the *Sustainable Development Strategy 2014*. The newly developed national policies to be assessed for all relevant sections that relate to biodiversity that can guide the NBSAP revision

The revised *NBSAP*, the *Policy on Protected Areas 2014* to then be implemented by the Department of Environment and Conservation and socialised with other line departments and government agencies for inclusion in their work plans.

Governance
Laws that relate to biodiversity and the environment to be reviewed and harmonised wherever possible such that they reinforce and compliment each other.

Data
The SIMS database to be upgraded to a database that has sections that are publically available and user friendly and others which are secure for internal use only. This database to be linked to others within the country and to databases outside the country that contain information on PNG biodiversity wherever possible.

A Spatial Conservation Planning Blueprint
The Terrestrial and Marine PoWPA evaluations to be combined into a single Papua New Guinea Conservation Priorities Map with supporting data layers, outline of the process followed and defined logic of decisions made, which includes the *Aichi* area targets. This process to be refined by DEC on a regular basis with new information and broadened to include the customary and social values of biodiversity.

Ecosystem Services Development
An assessment of ecosystem services across the country and their value/replacement value. These ecosystem services to then be linked to

human wellbeing and or poverty reduction. An example being the provisioning services of fresh water and its relative importance to domestic water use or hydropower that can be determined in a multivariate analysis. Another example is the provisioning, regulating and cultural services of the rainforest. Currently the carbon value in relation to REDD+ is being developed in pilots in selected areas of PNG and this is foundational in an potential future carbon offset mechanism.

Valuing Environmental/Ecosystem Services in Local and National Accounting

The value of environmental/ecosystem services needs to be incorporated into National Accounting. In this way the costs of changes in the environment can be. considered and inform development plans and any associated permits or offset requirements. In this way the costs of development that impact upon the environment can be recognised and recompensed.. Also there is a policy gap on the payment for ecosystem services that needs to be addressed. This would also determine legislative requirements and the outline of a mechanism to achieve PES.

Biodiversity Offset

The concept of Biodiversity Offset is an emerging strategy for development projects to link their conservation efforts into the PNG NBSAP. Payment for Ecosystem Services along with Equitable Benefit Sharing as a new paradigm in development projects is also a way forward. Determination of the value of these services is required.

Mainstreaming Conservation

Reaching all areas of the country with environmental initiatives has been shown to be complex. The strategy of reaching all communities through Mainstreaming Nature Conservation was the theme of the Action Strategy for Nature Conservation in the Pacific Region, 2003-2007 which contained 30 year goals. However this has not been referred back to in applying this concept.

The foremost and most effective action conservationists can take now to mitigate the coming crisis is to prepare the national conservation communities so they are more capable to deal with the unknowns ahead.

Investing income from resource extraction in responsible development

The PNG LNG project is a game changer for the country and the economic growth that it drives along with other current and future resource extraction projects must also fund activities to implement the new responsible development strategy that lead to sustainable ecological and biodiversity management. This will require political will, a clear implementation plan and a fully resourced and capable agency to lead a collaborative effort of implementation in partnership with all stakeholders.

This report to also be the basis of defining what initiatives are not on target as identified within Tables x, xx and xxx. The causes of this to be identified and a strategy put in place for each as a guideline for implementation.

Appendix I Acronyms

ADB	Asian Development Bank
C-CAP	[USAID] Coastal Community Adaptation Project
CA	Conservation Area
CARR	[principals of] Comprehensiveness, Adequacy, Representativeness and Resilience
CBD	[United Nation] Convention on Biological Diversity
CBO	Community Based Organisation
CCA	Climate Change Adaptation
CEPA	Conservation and Environmental Protection Agency
CELCOR	The Centre for Environmental Law and Community Rights [Incorporated]
CI	Conservation International
CLMA	[Papua New Guinea] Centre for Locally Managed Areas [Incorporated]
CR	[IUCN Red list] Critical
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CTI	Coral Triangle Initiative
CTI-CFF	Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security
CTSP	Coral Triangle Support Program
DEC	Department of Environment and Conservation
DEC-CP	Department of Environment-Corporate Plan
DHW	Degree Heating Week
DSP	Development Strategic Plan
DOLPP	Department of Lands and Physical Planning
EAFM	Ecosystem Approach to Management of Fisheries
EFF	[Papua New Guinea] Eco-forestry Forum
EU	European Union
EIA	Environmental Impact Assessment
EN	[IUCN Red list] Endangered
EEZ	Exclusive Economic Zone
ENSO	El Niño/Southern Oscillation
ESEG	Environmentally Sustainable Economic Growth
GCCA	Global Climate Change Alliance
GEF	Global Environment Facility
GHG	Green House Gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GovPNG	[National] Government of Papua New Guinea
ha	Hectare
ICZM	Integrated Coastal Management
IPZ	Interim Protection Zone
ITTO	International Tropical Timber Organisation
IUCN	International Union for Conservation of Nature
km^2	Square Kilometer
LEAF	Lowering Emissions in Asia's Forests
LMMA	Local Marine Management Area
LULUCF	Land Use, Land Use Change and Forestry
MARSH	Mangrove Rehabilitation for Sustainably-Managed Healthy Forests
MDG	Millennium Development Goal(s)
MECCN	Manus Environment Conservation Communities Network
MSC	Marine Stewardship Council
MTDP	Medium Term Development Plan
MTDS	Medium Term Development Strategy

Mt CO_2e	Megatonnes Carbon Dioxide Equivalent
MW	Mega Watts
NAQIA	National Agriculture and Inspection Authority
NARI	National Agricultural Research Institute
NBSAP	National Biodiversity Strategic Action Plan
NCC	National Conservation Committee
NFA	National Fisheries Authority
NFI	National Forest Inventory
NGO	Non Government Organisation
OCCES	Office of Climate Change and Environmental Sustainability
OCCD	Office of Climate Change and Development
p.a.	per annum
PA	Protected Area
PACAM	[USAID] Pan-American Climate Fund
PES	Payment for Ecosystem Services
PINBio	Papua New Guinea Institute of Biodiversity
PIP	Public Investment Plan
PNA	Policy Needs Assessment
PNG	Papua New Guinea
PNGFA	Papua New Guinea Forest Authority
PNG LNG	Papua New Guinea Liquid Natural Gas [Project]
PoWPA	Plan of Work Protected Areas
ProDoc	Project Document
RAPPAM	Rapid Assessment and Prioritisation of Protected Area Management
REDD+	Reduced Emissions from Deforestation and Forest Degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks.
SIMS	Species Information Management System
SLUP	Sustainable Land-use Plan
SPC	Secretariat of the Pacific Community
SPREP	South Pacific Regional Environment Programme
SST	Sea Surface Temperature
TAC	Total Allowable Catch
TCA	Tenkile Conservation Alliance
TNC	The Nature Conservancy
UNFCC	United Nations Framework Convention on Climate Change
UPNG	University of Papua New Guinea
USAID	United States Agency for International Development
UN	United Nations
UNDP	United Nations Development Program
UNESCO	United Nations Education, Science and Cultural Organisation
VU	[IUCN Red list] Vulnerable
WCS	Wildlife Conservation Society
WMA	Wildlife Management Area
WWF	World Wide Fund for Nature

Appendix II Contact Information

Enquiries should be made to:

Office of the Secretary
Department of Environment and Conservation
P. O. Box 6601 BOROKO
National Capital District
Papua New Guinea
Email: info@occd.gov.pg
Website: www.occd.gov.pg

Principal Author: David K. Mitchell
PO Box 438 Alotau
Milne Bay Province
Papua New Guinea
E mail: dkymmitchell@gmail.com

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Appendix III Outline of Process in the Compilation of this Report

This 5th Report came out of discussions with key leadership within the Department of Conservation and the principal author on the outline requirements as per the CBD.

Staff within the Department contributed information relevant to their section in relation to the required information required within the report.

Staff within key Government Department and Agencies, NGOs, research Institutions, business were contacted and information relevant to biodiversity was requested for inclusion in the report.

The principal author made a desk top study of available documents and combined these with all additional information from stakeholders.

This was the basis of an initial draft report which was sent out to stakeholders for comment either through e mail or through attendance of a verification workshop held at the offices of the Department of Conservation in Waigani. Comments from this workshop were incorporated into the final draft.

All references used during desk top study and those from which information was gained are outlined in the reference section of the document.

The Department of Conservation moved office locations within this reporting period and much of the hardcopy information has been put into unorganised storage and is therefore retrieval was not possible. Similarly the Office of Climate Change and Development which comes under the same National Ministry as Environment has also changed location and has faced similar constraints.

This drat was then presented to the Secretary of the Department of Environment and Conservation for his consideration.

Appendix IV References Used and other Source Information

Alcorn, J.B. (Ed.) 1993. *Papua New Guinea Conservation Needs Assessment Vol. 1*. Biodiversity Support Program, Government of Papua New Guinea, Department of Environment and Conservation. Corporate Press Inc., Landover, Maryland.

Alonso, L., Deichmann, J.L., Mckenna, S.A., Naskreck, P. and Richards, S. (Eds) 2011. *Still Counting: Biodiversity Exploration and Conservation. The first 20 years of the Rapid Assessment program*. Conservation International Arlington USA pp 316

Annon. 2006. *Access and Benefit Sharing: Policy and Legal Implications for Papua New Guinea.* Report for the Papua New Guinea Institute of Biodiversity. 139 pp.

Annon. 2011. *Community-based Forest & Coastal Conservation and Resource Management in Papua New Guinea*. Project Document GEFSEC PROJECT ID: 3954

Annon. 2014. *Tree Kangaroo conservation Program Annual Report 2013* pp. 52

Avosa, M. and Rungol, A. 2011. *Forest Governance Integrity Baseline Report, Papua New Guinea.* Transparency International Papua New Guinea Inc. 26. pp.

Beehler, B. M. (Ed.) 1993. *Papua New Guinea Conservation Needs Assessment Vol. 2.* Biodiversity Support Program, Government of Papua New Guinea, Department of Environment and Conservation. Corporate Press Inc., Landover, Maryland.

Bourke, R.M. and Harwood, T. (Eds) 2009. F*ood and Agriculture in Papua New Guinea.* ANU E Press, The Australian National University, Canberra.

Burke, L., Reytar, K., Spalding, M. and Perry, A. 2014. *Reefs at Risk Revisited; Summary for Decision Makers.* World Resources Institute. Washington DC. 54 pp.

Butler, J., Skewes, T., Mitchell, D.K., Pontio, M. and Hills, T. 2014. Stakeholder perceptions of ecosystem service declines in Milne Bay, Papua New Guinea. IS human population a more critical driver than climate change? *Marine Policy.* 46 1-13

Chatterton, P., Yamuna, R., Higgins-Zogib, L., Mitchell, N., Hall, M., Sabi, J., Jano, W., Duguman, J., Mogina, J., Mowbray, D., Melick, D. and Leggett, M. 2009. *An assessment of the effectiveness of Papua New Guinea's Protected Areas using WWF's RAPPAM Methodology*. WWF.

Christie, P., Pollnac, R., Stevenson, T. and Pietri, D. 2014. *Lessons from the US Coral Triangle Support Program.* Final Report USAID, Washington DC. 73 pp.

Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security. 2013. *CTI-CFF 1st Regional Exchange on Seascapes.* Summary Report. Manila, Philippines. 126 pp.

Department of Environment and Conservation. 2007. *National Biodiversity Strategy and Action Plan*. Port Moresby 18 pp.

Department of Environment and Conservation. 2009. *Supporting Country Action on the CBD Programme of Work on Protected Areas.* Port Moresby. 57 pp.

Department of Environment and Conservation. 2010. *Papua New Guinea's Fourth National Report to the Convention on Biological Diversity*. Port Moresby. June 2010. 86 pp.

Department of Environment and Conservation. 2011. *A protected Area Policy for a Protected Area System for Papua New Guinea*. Discussion Paper December 2011. Port Moresby.

Department of Environment and Conservation. 2013. *Draft Protected Area Policy for Papua New Guinea.* 5 May 2013. 55 pp.

Department of Environment and Conservation. 2014. *A protected Area Policy for a Protected Area System for Papua New Guinea*. Port Moresby.

Department of Environment and Conservation and the PNG National Fisheries Authority. 2009. *Papua New Guinea Marine Program on Coral Reefs, Fisheries and Food Security. National Plan of Action 2010-2013*. Port Moresby. 57 pp.

Department of Environment and Conservation, Office of Climate Change and Carbon Trade and the PNG National Fisheries Authority. 2009. *Papua New Guinea Marine Program on Coral Reefs, Fisheries and Food Security. National Plan of Action 2010-2015.* Port Moresby. 46 pp.

Department of Health. 2007. *National Policy on Traditional Medicine*. March 2007. Port Moresby. 20 pp.

Department of Lands & Physical Planning. 2014. *National Sustainable Land Use Policy*. Port Moresby. 89 pp.

Department of National Planning and Monitoring. 2010. *Papua New Guinea Medium Term Development Plan 2011-2015; Building the Foundation for Prosperity*. Port Moresby. 168 pp.

Department of National Planning and Monitoring. 2010. *Papua New Guinea Development Strategic Plan 2010- 2030.* Port Moresby.

Department of National Planning and Monitoring. 2014. *National Strategy for Responsible Sustainable Development for Papua New Guinea; The Strategy*. 72 pp.

Earthworks and MiningWatch. 2012. Troubled waters: How Mine Waste dumping is poisoning our Oceans, Rivers and Lakes. Canada. 44 pp.

ECG. 2011. *Payment for Ecosystem Services; A proposed PES system for Papua New Guinea.* Draft 2. Port Moresby. 5 pp.

Esso Highlands Limited. 2010. *Biodiversity Strategy.* PNG LNG. 108 pp.

Food and Agriculture Organisation of the United Nations. 2010. *National Fishery Sector Overview: Papua New Guinea*. 20 pp.

GHD. 2013. S*trategic Program for Climate Resilience.* An Inception Report to the Asian Development Bank. TA-8362 PNG. 292 pp.

Green, A., Kertesz, M., Peterson, N., Retif, S., Skewes, T., Dunstan. P., McGowan, J., Tulloch, V. and Kahn, B. 2014. *A Regionalisation of Papua New Guinea's Marine Environment*. A technical report prepared for Papua New Guinea's Department of Environment and Conservation with support from the Australian Government. 17 pp.

Greenpeace. 2008. Preserving Paradise: *The value of protecting Papua New Guinea's forests for climate*. Greenpeace International, Amsterdam. 31 pp.

Government of Papua New Guinea. 2009. *Papua New Guinea Vision 2050*. National Strategic Plan Taskforce. Port Moresby. 63 pp.

Government of Papua New Guinea and Australian Government. 2009. *Second Joint Understanding 2010-2015 between Papua New Guinea and Australia on the Owen Stanley Ranges, Brown River Catchment and Kokoda Track Region*. 5 pp.

Government of Papua New Guinea and Australian Government. 2012. *Kokoda Track Initiative. Annual Report 2010-2011.* 15 pp.

Government of Papua New Guinea and Australian Government. 2013. *Kokoda Track Initiative. Annual Report 2011-2012*. 19 pp.

Havemann, P. and Smith, R. 2007. *Community Based Management of Dugong and Turtle Fisheries.* Summary of Torres Strait Dugong and Marine Turtle Project Governance Review. James Cook University. 8 pp.

Kaly, U., Preston, G., Opnai, J., Aini, J. 2007. *Sea cucumber survey in New Ireland Province.* Coastal Fisheries Management and Development and the Papua New Guinea Fisheries Authority Port Moresby pp. 37

Leisz, S.J. and Burnett, J.B. 2009. Climate Change and Biodiversity in Melanesia. *Bishop Museum Technical Report 42 2008-2009 pp. 159*

Leverington, F.L. & A., Peterson, A. & G. 2014. *Papua New Guinea Draft Policy on Protected Areas*. A draft report PNG Policy on Protected Areas; Options Paper to UNDP and the Department of Conservation. May 2014. 86 pp.

Lipsett-Moore, G., Game, E., Peterson, N., Saxon, E., Sheppard, S., Allison, A., Michael, J., Singadan, R., Sabi, J., Kula, K. and Gwaibo, R. 2010. *Interim National Terrestrial Conservation Assessment for Papua New Guinea: Protecting Biodiversity in a changing Climate*; Pacific Island Countries Report No. 1/2010. 92 pp.

Hoegh-Guldberg, O., Hoegh-Guldberg, H., Veron, J.E.N., Green, A., Gomez, E. D., Lough, J., King, M., Ambariyanto, Hansen, L., Cinner, J., Dews, G., Russ, G., Schuttenberg, H. Z., Peñaflor, E.L., Eakin, C. M., Christensen, T. R. L., Abbey, M., Areki, F., Kosaka, R. A., Tewfik, A., Oliver, J. 2009. *The Coral Triangle and Climate Change: Ecosystems, People and Societies at Risk*. WWF Australia, Brisbane, 276 pp.

Ministry of Agriculture and Livestock. 2006. *National Agriculture Development Plan 2007-2016. Policies and Strategies.* Port Moresby Vol. 1. 22 pp.

Ministry of Agriculture and Livestock. 2006. *National Agriculture Development Plan 2007-2016. Policies and Strategies*. Port Moresby Vol. 2. 272 pp.

Ministry of Forests. 2009. *Forestry and Climate Change Framework for Action* 2009-2015. Port Moresby. 18 pp.

Mitchell, D.K., Ewai, M, Gamui, B. and Sabi, J. 2013. *Community-based Forest and Coastal Conservation and Resource Management Project. Biodiversity Survey and Data Capture, Data Analysis and Species Information Management Methods and Approaches for Application in Papua New Guinea*. Goroka, PNG Department of Environment and Conservation.

Mitchell, D.K., Ewai, M, Conn, B., Gamui, B. and Sabi, J. 2013. *Community-based Forest and Coastal Conservation and Resource Management Project. Biodiversity Survey and Data Capture, Data Analysis and Species Information Management Methods and Approaches for Application in Papua New Guinea*. Cairns 2-4 July, PNG Department of Environment and Conservation.

Mittermeier, R.A., Myers N., Thomsen J.B., da Fonseca, G.A.B. and Olivieri, S. 1998. Biodiversity Hotspots and Major Tropical Wilderness Areas: Approaches to Setting Conservation Priorities. *Conservation Biology*, Vol. 12(3):516-520

Myers, N., Mittermeier R.A., Mittermeier C.G., da Fonseca G.A.B and Kent, J., 2000. Biodiversity hotspots for conservation priorities. *Nature* 403, 853-858

National CTI Coordinating Committee of Papua New Guinea. 2012. *State of the Coral Reefs of Papua New Guinea. Coral Triangle Marine Resources, their status, Economies and Management.* 65 pp.

Nelson, P.N., Gabriel, J., Filer, C., Banabas, M., Sayer, J.A., Curry, G.N., Koczberski, G. and Ventre, O. 2014. Oil Palm and Deforestation in Papua New Guinea. *Conservation Letters,* May/June 2014, 7(3), 188–195

New Britain Palm Oil Limited. 2014. *2013 Annual Report*. Kimbe, Papua New Guinea. 94 pp.

Office of Climate Change and Environmental Sustainability. 2010. *Climate Compatible Development for Papua New Guinea*. Second Draft for Stakeholder Comment March 2010. Port Moresby.

Office of Climate Change and Environmental Sustainability. 2014. *National Climate Compatible Development Management Policy*. Port Moresby. 56 pp.

Pacific Islands Forum Secretariat. 2012. *Pacific Regional MDGs Tracking Report*. Suva, Fiji. 211 pp.

Pacific Islands Forum Secretariat. 2013. *Pacific Regional MDGs Tracking Report*. Suva, Fiji. 113 pp.

Papua New Guinea Forest Authority. 2009. *National Forestry Development Guidelines*. Port Moresby. Papua New Guinea. 36 pp.

Papua New Guinea Forest Authority. 2013. *National Forest Plan*. Draft. Port Moresby. 62 pp.
Papua New Guinea LNG. 2010-2014. *Quarterly Environmental and Social Report*. First Quarter 2010 - Second Quarter 2014. Port Moresby PNG

Richards, S. and Whitmore, N. (Eds) 2013. *A raid biodiversity assessment of the Hindenburg Wall Region, Western Province, Papua New Guinea.* 381 pp.

Roe, D. 2010. *Marine Turtle and Dugong Awareness Program for Western Province, Papua New Guinea: Outcomes of Development Workshop, 10 June 2010*, Daru. Report prepared for the Marine and Tropical Sciences Research Facility (MTSRF). Sea Turtle Foundation, Townsville. 25 pp.

Shearman, P. and Bryan, J. 2010. A bioregional analysis of the distribution of rainforest cove, deforestation and degradation in Papua New Guinea. *Austral Ecology*.

Skewes, T. Lyne, V. Butler, J., Mitchell, D.K, Poloczanska, E., Williams, K., Brewer, D., McLeod, I., Rochester, W., Sun, C., and Long, B. 2011. *Melanesian coastal and marine ecosystem assets: assessment framework and Milne Bay case study.* CSIRO Final Report to the CSIRO AusAID Alliance. 149 pp.

South Pacific Regional Environment Program. 2004. *Action Strategy for Nature Conservation in the Pacific Region, 2003-2007: Mainstreaming Conservation*. Apia, Samoa. 23 pp.

Stanley, S.A. 2013. REDD Feasibility Study for Central Suau, Milne Bay Papua New Guinea. On behalf of SPC/GIZ Regional Project Climate Protection through Forest Conservation in Pacific Island Countries. Suva, Fiji. pp. 41

Thompson, C. 2011. *Final Frontier: Newly discovered species of New Guinea (1998-2008)* World Wide Fund for Nature, Western Melanesian Programme Office. 55 pp.

United Nations Development Programme. 1994. *Yumi Wankain*: Report of the United Nations Joint Inter-Agency Mission to Papua New Guinea on Sustainable Development. Port Moresby: United Nations Development Programme. 72 pp.

University of the South Pacific. 2012. *Ecosystem Profile. East Melanesian Islands Biodiversity Hotspot*. Critical Ecosystem Partnership Fund. 252 pp.

USAID. 2012. US *Coral Triangle Initiatives Support Program Summary of Papua New Guinea CTI-CFF Achievements.* 2 pp.

Wickham, F., Kinch, J., Mitchell, D.K., Bongro, M., Alphonse, R., Sissiou, G., Maru, G., Kula, G. and Nicholls, S. 2010. *Assessing the Capacity of Papua New Guinea to Implement the United Nations Convention on Biological Diversity (UNCBD), the United Nations Convention to Combat Desertification (UNCCD), and the United Nations Framework Convention on Climate Change (UNFCCC*). South Pacific Environment Programme. 119 pp.

Winn, P. 2012. *Up for Grabs: Millions of hectares of customary land in PNG stolen for logging*. Greenpeace, Australia Pacific. 68 pp.

Wise, R.M., Butler, J.R.A., Skewes, T., Bohensky, E. and Peterson, N. 2014. *The future economics of marine ecosystem services in Kimbe Bay, Papua New Guinea: implications for Locally Managed Marine Areas*. Report prepared for the Department of Sustainability, Environment, Water, Population and Communities as part of the Coral Triangle Initiative on Coral Reefs, Food Security and Fisheries. CSIRO, Australia. 35 pp.

National Constitution 1975
Conservation and Environment Protection Authority Act 2014
Conservation Act 2000
Conservation Areas Act 1978
Customs Recognition Act 1963
Crocodile Trade (Protection) Act 1974
Dumping of Waste at Sea Act 1979
Fauna (Protection and Control) Act 1966
Fisheries Management Act 1998
Forest Act 1991
International Trade (Fauna & Flora) Act 1979
Lands Act 1996
Mining Act 1992
National Cultural Property (Preservation) Act 1965
National Seas Act 1977
National Parks Act 1982
Oil and Gas Act 1998
Organic Law on Provincial and Local level Government 1995
Whaling Act 1974

Annex I Terrestrial Protected Areas