A Strategic Assessment of Spatial Planning Options for Papua Province

This assessment was supported by
The Strategic Environmental Assessment Programme of the

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1. EXECUTIVE SUMMARY

The first phase of the strategic assessment for spatial planning in Papua Province, Indonesia, was carried out during the last quarter of 2007 and the first quarter of 2008. This timing coincided with the United Nations Forum on Climate Change, held in Bali in December 2007, which served to inspire the work done in Papua and which was also part of a parallel process where team members were involved both in the strategic assessment in Papua, as well as in the preparations for the Conference.

The strategic assessment has followed an analytical and participatory approach for mainstreaming environmental and social issues into the decision-making and implementation process in Papua. However this assessment is only the first stage of the decision-making process.

During the process a baseline and stakeholder assessments were carried out, social priorities have been assessed, spatial data has been compiled and maps have been generated.

The assessment of spatial data for Papua (and West Papua[1]) reveals that the majority of (around 85%) of Papua and West Papua are still covered with intact forests and that, to date, deforestation rates have been minimal over the last decade (in comparison with, for example Kalimantan and Sumatra which have seen large scale deforestation, thus contributing to Indonesia's status is the world's fourth largest polluter). The forests of Papua are rich in plant and animal biodiversity, but as regards the human population, Papua is sparsely populated (approximately 17/km^2). Most of the population live along the coastal areas which have also accommodated many people from other islands coming to Papua as part of several waves of transmigration; the indigenous Papuan population tends to be most dominant in the highland areas. Papua exhibits a much greater diversity of ethnicities and cultures than any other Indonesian province and supports about 250 languages.

Economically, Papua has had very high growth rates (between 2001 and 2005 this was at the rate of some 10% per annum) mostly as a result of mining. However, the mining industry is extremely capital intensive employing less than 1% of the workforce. It is the labour-intensive agricultural sector which accounts for most of the work force – this sector is characterised by traditional farming systems, supplemented by hunting and gathering.

The forestry sector is extremely important but also a source of dissension. Central government would prefer to see large-scale logging and the conversion of forests to oil palm plantations; the provincial government has committed itself to the development of community-based logging.

The transport sector is key in a Province which is so large, with a population so scattered and with major physical obstacles to overcome (mountain ranges, rivers, etc.). There are very few roads, and the roads which do exist are poorly maintained. Water transport (sea and river) is important but requires better handling facilities; air transport is widespread but expensive and connects with a large network of very basic airstrips (there are only a few airports which will accommodate larger planes).

Papua is a paradox in its under-development. On the one hand the Province has extensive natural resources reserves and significant public expenditure budgets, and even before special autonomy and decentralisation, Papua was the second richest province in fiscal

[1] Note that while the present assignment only covers Papua Province, the mapping exercise has included data from West Papua also.

terms.[2] On the other hand, a lack of infrastructure, limited government capacity, and limited and low quality health and education services contribute to endemic poverty and poor human development indicators throughout the province. While the focus of the programmes under the Special Autonomy status seek to promote poverty reduction strategies while supporting the rights of indigenous Papuans, the province remains one of the poorest in Indonesia.

The forest, freshwater and marine natural endowments of Papua province, and indeed the whole island of New Guinea, are of global biodiversity conservation value, and among the richest on the planet. In addition, they are vital elements within the livelihood strategies of the people's of the province, and notably the indigenous population.

At the same time, there is intense competition by a range of stakeholders competing for control over the Province's rich natural resources, and in particular its mineral resources. Within this context, central government efforts to maintain control over the management of the Province's resources have been hotly contested, and regional autonomy and Papua's special autonomy law have encouraged both local governments and local people to assert control over natural resources and the extraction of these resources. The situation remains ambiguous particularly in situations where extraction of one resource (e.g. mineral extraction) is at the expense of sustainable management and/or protection of another resource (e.g. forests or areas of high biodiversity conservation value). This is, for example, the case in the Mamberamo basin, the largest unroaded tropical forest in the Asia Pacific region, with globally important high levels of biodiversity but also with potential for logging and mineral extraction.

Based on the assessment of the data and the discussions with stakeholders, development scenarios have been prepared which take up these issues and cover four major potential intervention areas:

- Transport and access, which focuses on expanding air, river and sea transport, and maintaining existing roads, rather than launching into a major road construction programme.
- Mining scenarios, which focus on changes in the way that revenues are distributed to ensure that these also benefit the community at large, and integrating technical advances to ensure that mine waste is handled in a way which minimises environmental impacts
- Forestry scenarios. Here the emphasis is on community-based small-scale sustainable logging with a concomitant scaling back on large-scale logging. In addition, this scenario includes the allocation of allocating forest land for carbon storage rather than for conversion; moreover the scenario will focus on best-practice methods (i.e. RSPO, HCVF, certification) to be applied to oil palm developments, logging operations and spatial plans.
- The Mamberamo scenario, attempts to find the balance between maintaining to the maximum extent possible Mamberamo's forested area as an area of global environmental importance, and opening up the area for sustainable agriculture, exploring carbon payments as development options, prioritising minimum impact road developments and possibly allowing a few well-regulated and managed mining operations.

For the four intervention areas, and following the SEA methodology, a number of scenarios have been developed for each. As point of departure a business-as-usual scenario is discussed, which assumes the continuation of existing development policies. Following on

[2] World Bank. (Draft) Papua Public Expenditure Analysis.

from this, a sustainable development scenario has been suggested for each potential intervention.

The sustainable development scenario focused on expanding and improving air, river and sea transport options that had less adverse impact on the environment and were more suitable for Papua's terrain and topography; focusing attention on the development of several large-scale mines that are managed and regulated to minimize environmental impacts and promote sustainable development in a transparent manner; scale back large-scale logging and replace it with small-scale community based logging (revenue generated from a few well-run large-scale mines is expected to lessen Papua's need to revert to forest exploitation); and rely upon good spatial planning to develop culturally-appropriate developments in the Mamberamo region that do not threaten the sustainability of one of the world's largest remaining lowland forest areas. These scenarios aimed to combine poverty alleviation with environmental sustainability and reduced carbon emissions within a win-win-win situation.

Both the business as usual scenario and a sustainable development scenario were assessed for the four focal areas—transport and access, mining, forestry and the Mamberamo region. The assessment determined that the business as usual scenario would result in unequal economic development; a range of social problems such as the marginalization of indigenous people and lost access to forests and the resources they provide; and environmental impacts resulting from large-scale deforestation and mining. This is because this option focused on promoting economic development through extensive exploitation of Papua's natural resources and major road developments that support the forestry and mining industry but divert development funds away from essential development activities.

The sustainable development scenario allowed the Papuan people to potentially profit and benefit from: appropriate transport services that provide poor, isolated people with access to health and education services, the carbon stored in forests and other goods and services these forests provide; well-managed mines that generate substantial revenue, health and education services and other infrastructure for district governments and local communities; and a globally recognized area of intact lowland forests that protect biodiversity, store carbon and attract eco-tourists to Papua.

Impact Area	Business-as-Usual	Sustainable Development
Economic	• 2020 GDRP = $4661 million • Per capita income = $1654	• 2020 GDRP = $8921 million • Per capita income = $3491
Social	• Increased migration from highlands to coast • Increased marginalization of interior communities • Social benefit of around $300 per capita	• Lower migration rate with higher service provision • Reduced incidence of HIV, prostitution & alcoholism • Social benefit of around $1380 per capita
Environmental	• Only 17.4 million ha of forest by 2020 • Indirect forest value of $500 million by 2020	• 23.5 million ha of forest by 2020 • Indirect forest value of $3600 million by 2020

The scenarios presented in the four intervention areas attempt to sketch out potential policy options and ways forward. However the present report is only a first step in this process. All

of the option and scenarios outlined in this report need to be discussed in detail with stakeholders in Papua to begin the process of developing a new spatial plan that will support sustainable development and sound decision making.

Finally, in order for the work carried out in Papua to have more of a regional spatial significance, a similar exercise needs to be carried out in West Papua. Here the data already gathered as part of the present exercise could serve as a basis.

2. INTRODUCTION

2.1 Overview

In 2007, the provincial government of Papua province requested assistance from the World Bank for spatial planning. The World Bank responded to this request by providing funds for a strategic environmental, social and economic assessment of different spatial planning and development options. A consortium of organizations (SEKALA, the Papuan Civil Society Strengthening Foundation and the Nordic Consulting Group) tendered for the assignment and was awarded a contract to carry out the assessment on 28 August 2007.

This report summarizes the findings of the assessment. It was prepared by SEKALA (who led the assessment), Nordic Consulting Group and PCSSF to meet the requirements of contract no. 7144288 which obliges the above mentioned parties to carry out a Strategic Assessment for Spatial Planning in Papua Province, Indonesia.

2.2 Objective of the Assignment

The overall objective of the assignment is to assist Papua province to develop a spatial plan by assessing the economic, social and environmental consequences of different development scenarios. In addition, the Assessment will help build the capacity of the Papua provincial government to integrate environmental and social concerns in development planning. It will also assist the provincial government to comply with EIA procedures and facilitate inter-institutional coordination.

2.3 Scope and Tasks

Specifically, the following tasks will be undertaken under this assignment:

1. **Baseline Assessment**: Collect and review relevant information, especially in key areas for spatial planning such as infrastructure, agricultural development and forestry.
2. **Stakeholder Analysis:** identify key stakeholders and assess their interests and concerns in relation to the proposed spatial plan. This should be based on interviews, focus groups and existing information, resulting in a stakeholder matrix.
3. **Identification of Economic, Environmental and Social Priorities**: Identify the economic, environmental and social priorities of multiple stakeholder in Papua Province.
4. **Scenario Building:** Develop a range of options for spatial development with a set of different assumptions on development policies, growth and environmental quality. Critical factors considered for the options were:
    - Business as Usual (continuation of existing development policies)
    - Poverty alleviation opportunities
    - Alternative transport options
    - Revenue generating opportunities
    - Land suitability analysis
    - Cultural preservation
    - Local and global environmental benefits accrued from carbon storage and avoided deforestation
5. **Assessment of Effects on Economic, Environmental and Social Priorities:** Assess cumulative and induced economic, environmental and social consequences of each scenario over a 5-10 year timeframe. Consequences should be assessed according to key indicators such as:
    - Economic - % of population below poverty line; chance in income distribution; projected GDP per capita; change in government revenue.
    - Environmental-change in natural forest cover; change in carbon emissions
    - Social- rural/urban migration rate; change in number of people involuntarily resettled; change in area subject to traditional land tenure.

6. **Geographic Information**: Collect and spatially analyse baseline information, development scenarios and projected consequences to allow for presentation and discussion.
7. **Intersectoral Coordination**: Help the provincial government to organize intersectoral meetings with governmental and non-governmental stakeholders to discuss priorities, scenarios, consequences and recommendations; and
8. **Hold a training workshop on SEA uses and techniques** for the staff of key government agencies as well as other stakeholders.

2.4 Methodology

The objective of the assignment is to carry out a SEA of a Spatial Development Plan for Papua Province. Strategic Environmental Assessment is an analytical and participatory approach for mainstreaming environmental and social issues into the decision-making and the implementation process at the strategic level. It involves environmental assessment of development programs, plans and policies of non-environmental sectors. A Strategic Environmental Assessment differs from an Environmental Impact Assessment (EIA, or AMDAL in Indonesian) in that it seeks to inform spatial plans and to proactively address the environmental, social and economic consequences of a proposed plan in order to support decision making.

The SEA methodology was defined and tailored to Papua's specific needs during the scoping phase, which took place during the preparation of the inception report. To be effective, the SEA process was highly personalized to accommodate the prevailing contextual administrative, social and economic conditions of Papua province. The approach was flexible and responded to the specificities of the assignment. The tailored product addresses the priorities and concerns of stakeholders (Government, Civil Society and the Private Sector).

The SEA team drew upon spatial data and other existing qualitative and quantitative data sources to carry out cost-benefit analysis, assess options and opportunities, propose mitigation options and consider the economic and social consequences of each option. The entire process was consultative and involved multiple stakeholders.

The endpoint of the SEA should be the definition of clear development and planning options that are the product of consensus among all stakeholders. As such, implementation, introduction into plans, future planning adjustments and decisions relating to the plan will have been considered and agreed. This requires significant funding and time. The present exercise stops short of this and only goes as far as the preparation of a draft report and an initial stakeholder workshop.

It needs to be realised that, for this process to have adequate stake-holder ownership of the results and the decisions, the work carried out thus far is only an initial step in the process. The remaining steps will involve a series of decision-making workshops based on visual materials prepared and revised as the process continues. In that sense the SEA process and methodology cannot be compared to a "traditional" assignment which operates with fixed dates and pre-defined time limits for comments and report finalisation.

Funds to carry out the additional decision-making and consensus seeking steps in the process have not been included in the present budgetary allocation. A more detailed description of activities conducted for this assessment is presented in Annex 1.

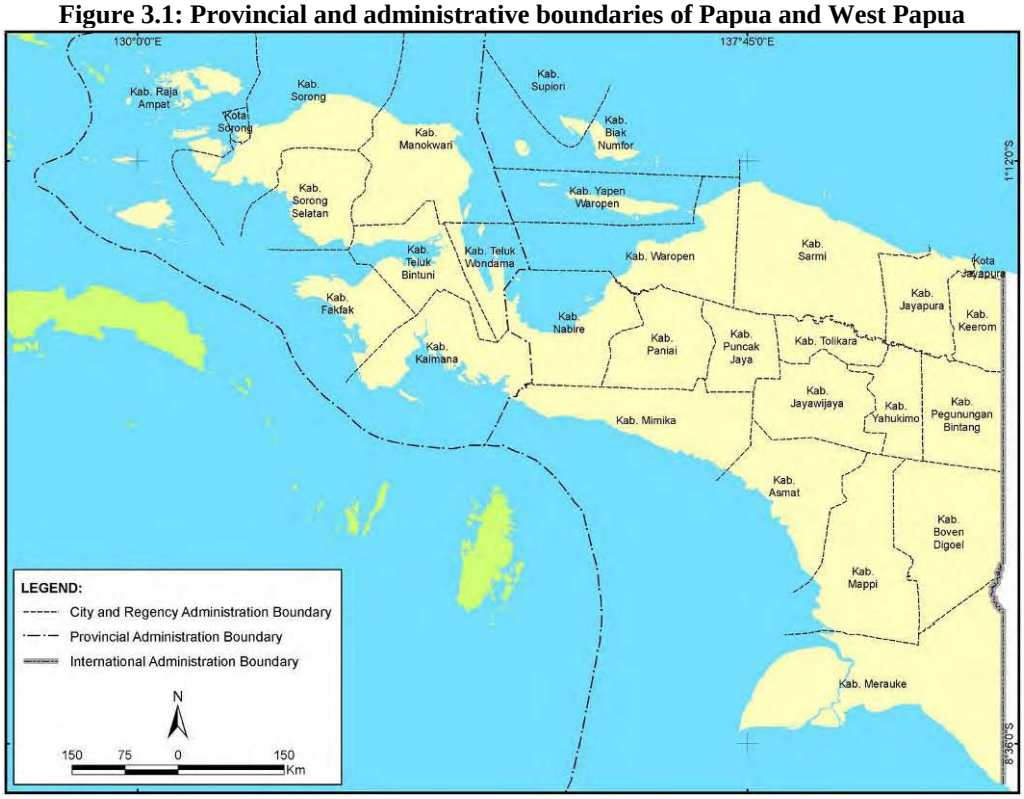
3. ASSESSMENT OF SPATIAL DATA ON PAPUA PROVINCE

This chapter describes some of the spatial data that SEKALA collected and mapped for this assessment.

3.1 Provincial and district boundaries

Papua province is located in the western half of the world's second largest tropical island, New Guinea. The province was officially created in 2003 when a Presidential Instruction (Inpres 1/2003) called for the creation of West Papua and three new districts (Mimika, Paniai and Puncak Jaya). The province of Papua covers 31.6 million hectares and presently contains 20 districts (Figure 3.1).

Figure 3.1: Provincial and administrative boundaries of Papua and West Papua



3.2 Papua's geographical zones

Papua encompasses a broad spectrum of landscape forms, ranging from coral reef and coastal habitats, vast inland freshwater swamps and lowland forests to montane forest and even snow-capped peaks.

Mainland Papua can be roughly divided into four geographical zones, each with a distinctive biota (Beehler 2007). The first, a **Central Cordillera,** divides the entire island of New Guinea, north and south. The Central Cordillera has been created by the compression of the Australian plate with the Pacific plate, with massive uplift over the last several million years. The Cordillera rises to more than 3,000 metres for its entire length of Papua. The highest peaks of Papua are scattered about the main Cordillera range. Highest of all is Mt Jaya (4,884m) which lies east of the highland town of Enarotali and the Paniai lakes.

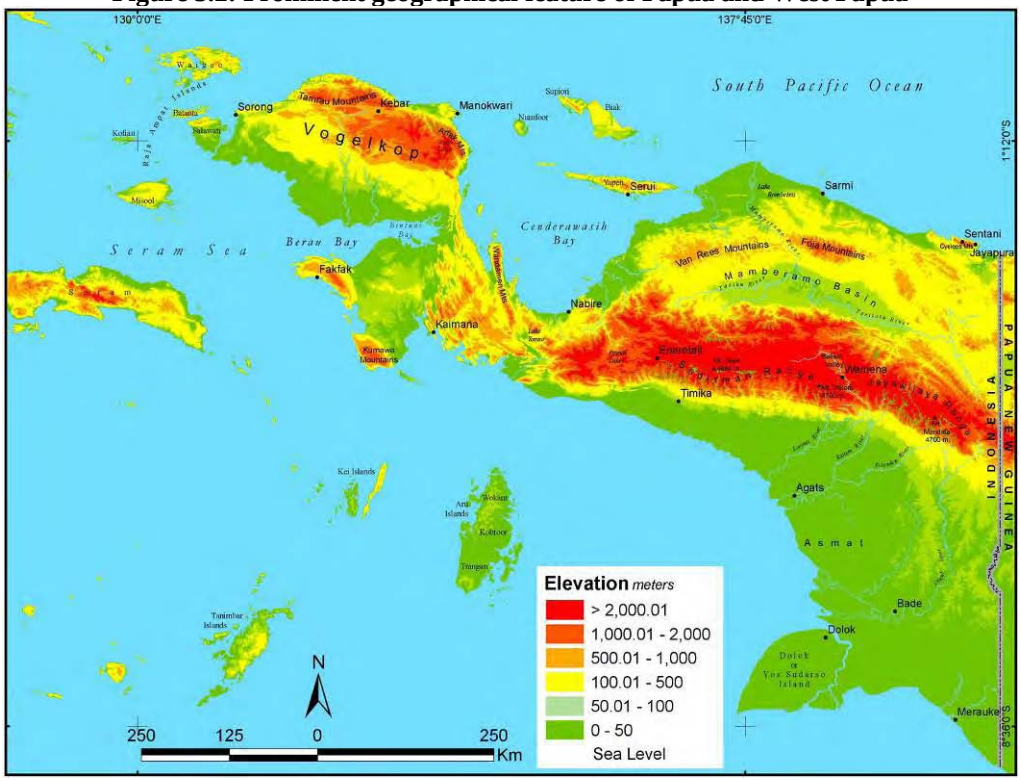
Nearby, Mt Idenburg stands at 4,717m. In central and eastern segments of the Cordillera stand Mount Trikora at 4,730m and Mount Mandala at 4,640m. Small, rapidly melting glaciers cap Mt Jaya and Mt Pilimsit.

Vast lowland areas occur on either side of this range (the second and third zones). This includes New Guinea's largest and least disturbed tropical humid forest catchment—the **Mamberamo Basin**—which is essentially the entire northern watershed of western New Guinea. The Mamberamo Basin encompasses nearly 8 million hectares, and is more than 93 percent forested, making it a vast, intact storehouse of globally significant biodiversity. It also dominated by inundated swamplands of various types. The Mamberamo river drains the interior Mamberamo Basin and virtually the entire northern watershed of Papua's central range. The main channel of the north-flowing Mamberamo cuts between the Foja Mountains (on the east) and the Van Rees Mountains (on the west) on its way out to sea. Two rivers form below the Cordillera range to form the Mamberamo river—the Taritatu river which drains the eastern half of the basin and the central mountains to the south and the Tariku river, which drains the smaller western side of the basin and quickly divides into the main flow of the Rouffaer (on the north) and the Van Daalen (to the south). Papua's largest lake—Lake Rombebai, can be found in the lower Mamberamo region, as well as a smaller lake—Lake Bira (Beehler 2007).

South of the Central Cordillera is found one of the world's largest freshwater wetlands and one of the world's most extensive mangrove systems. This area is dominated by extensive swamps and mangroves situated on peat soils and the **Transfly landscape**, which contains significant expanses of savannah, grasslands, wetlands, reeds and monsoon forests. The zone is drained by a number of significant rivers. Among these, the Digul river is the greatest, followed by the Baliem river that drains the Grand Valley of the Baliem. Other prominent rivers found in the southern lowlands are the Lorentz and the Eilanden rivers. Papua's largest island, Dolok, can be found in the Transfly landscape. This island is a vast mud-bank outwash arising from the silt-laden rivers of the southeast coast (Beehler 2007).

The fourth zone, the **Vogelkop (or Birds Head)** is connected to the rest of New Guinea by a rugged narrow and curving isthmus. Here are a number of isolated mountain ranges punctuating the lowlands (e.g. Papua's Cyclops, Van Rees, and Foja mountains) (Frazier 2007). The fourth zone falls within the province of West Papua, while the first three geographical zones primarily fall within the province of Papua—the main focus of this study (Figure 3.2).

Figure 3.2: Prominent geographical feature of Papua and West Papua



3.3 Land and forest cover

Papua's land cover map indicates that the majority (~ 85%) of Papua and West Papua are still covered with intact forests. Recent MODIS satellite imagery analysis conducted by the South Dakota State University's Geographic Information Science Centre of Excellence in partnership with the Indonesian Ministry of Forestry, the World Resources Institute, SEKALA and the United States Geological Survey has revealed that deforestation has been minimal in Papua over the last decade (just 1% of the national total). The island groups featuring the most change continue to be Sumatra and Kalimantan. Over 95% of Indonesia's deforestation occurred on these two islands between 2000 and 2006.

Over 47% of Papua forests are classified as lowland rainforest—making Papua province home to the largest remaining tracts of lowland forest in Indonesia. Large areas of mangrove forest (3.3% of forested land), swamp ecosystems (17.08% of forested land) and montane forest (12.3% of forested land) are also found, in addition to several other ecosystem types, each of which comprise less than 3% of Papua's total area (Table 3.1).

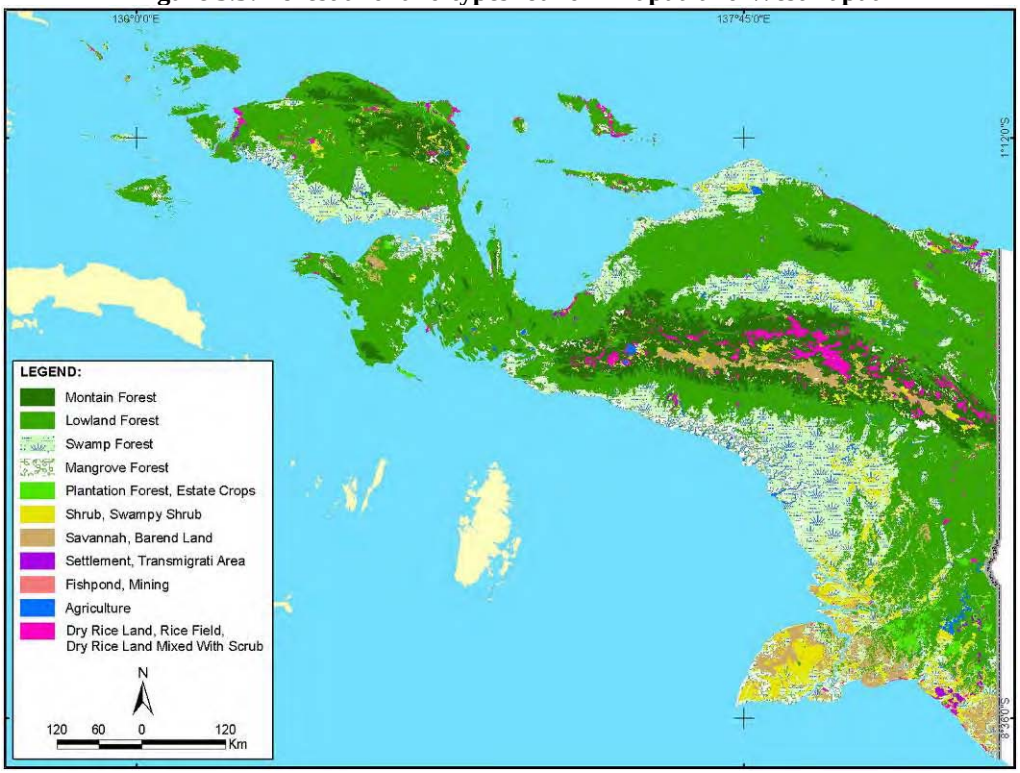
Table 3.1: Major land classes in Papua province

Land class	Area (ha)	% of total land
Lowland forest	14,822,306	47.10
Mangrove	1,065,576	3.39
Swamp forest	5,373,851	17.08
Montane forest	3,874,984	12.30
Plantation forest	222,415	0.71
Rice field	8,280	0.03
Savannah	945,312	3.00
Shrub	751,340	2.39
Swampy shrub	1,174,857	3.72

Estate crops	44,859	0.14
Mining	1,969	0.01
Settlement	28,969	0.09
Aquaculture	385	0.00
Dry farming mixed with scrub	716,792	2.28
Dry farming area	81,600	0.26
Transmigration	102,510	0.33
Others	2,255,544	7.17
Total land area	**31,471,549**	100

Botanically, Papua's land cover is remarkable and estimated to house more than 15,000 species of vascular plants. Among the most notable are some 2000 species or orchids, more than 100 species of rhododendrons and the valuable and rare Kauri pine (*Agathis labillardierei*). Dipterocarp trees are relatively uncommon, but other valuable timber species, such as *Intsia bijuga* (merbau), *Pometia pinnata* (matoa), *Pterocarpus indicus* (rosewood) and *Dracontomelon* (black walnut), are relatively common (Beehler 2007).

Figure 3.3: Forest and land types found in Papua and West Papua



3.5 Forest use categories

Papua's forests are divided into production, conservation, protection and conversion forests. Production forests are primarily set aside for logging and conversion forests are set aside for agricultural development, settlements or other land uses. Conservation forests are set aside to conserve biodiversity while protection forests are supposed to be allocated to protect steep slopes, watershed functions and environmental service, such as carbon storage.

Analysis of these categories indicates that:

- Only 3% of Papua's land area falls outside the forest estate. This area totals just 851,940 ha and is primarily located in residential areas.

- 20% of Papua's forest estate (6.6 million ha) is slated for conversion.
- 25% of Papua's forest estate is designated as production forest and the great majority of this land has already been allocated to large-scale timber concessions and industrial timber companies.
- 20% of Papua's forest estate has been designated for conservation and protection. A similar percentage of the total land area designated for conservation and protection can not be found in any other province in Indonesia, except for in West Papua.

A number of districts also have large amounts of land designated for conservation or protection. For instance, 90% of Pegunungan Bintang is designated for conservation and protection; 84% of Tolikara is designated for conservation and protection; and 78% of Yahukiumo is designated for conservation and protection. This leaves very little room for these three districts to convert forests to other land uses or to undertake other natural resource extraction activities, such as logging and mining.

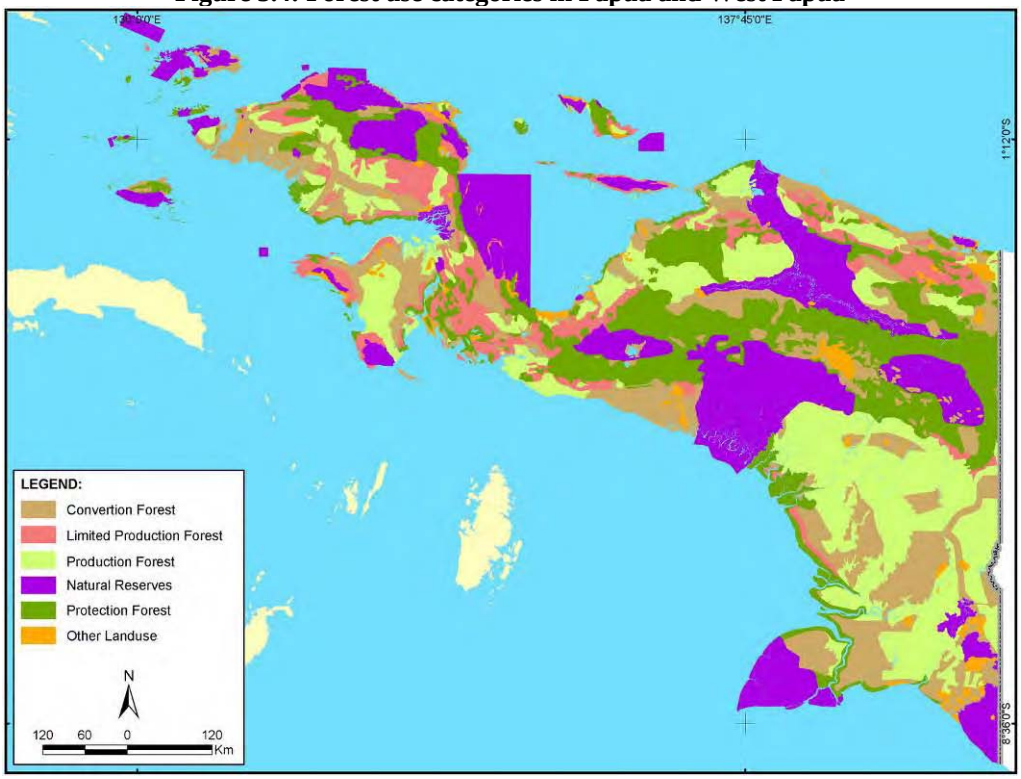
Around 40% of Papua's lowland forests have been zoned as production forest and only 19% have been zoned as conservation forest (Table 3.2). This is a matter of concern because lowland forests tend to be extremely biodiverse and are also targeted for logging and agriculture. These forests are therefore threatened in the majority of Indonesia and are predicted to disappear in Sumatra and Kalimantan in the near future.

Table 3.2: Forest types found in forest categories in Papua province

Forest Cover	Area (ha)	Percent of total area	Percent in production forest	Percent in conservation forest	Percent in Conversion forest	Percent in Protection forest
Lowland	14,773,248	47.81	40.47	13.65	19.34	24.53
Mountain	3,874,632	12.54	0.75	36.37	9.19	52.17
Swamp	5,348,910	17.31	44.75	21.02	24.81	7.38
Mangrove	1,040,029	3.37	8.93	39.85	15.53	33.99
Other	5,862,972	18.97	23.39	28.24	26.99	15.95
Total	30,899,793	100.00				

Mountain forests and mangrove forests are primarily designated for conservation. Mountain forests are likely to have been designated for conservation because these forests are found on steep slopes and provide watershed functions.

Figure 3.4: Forest use categories in Papua and West Papua



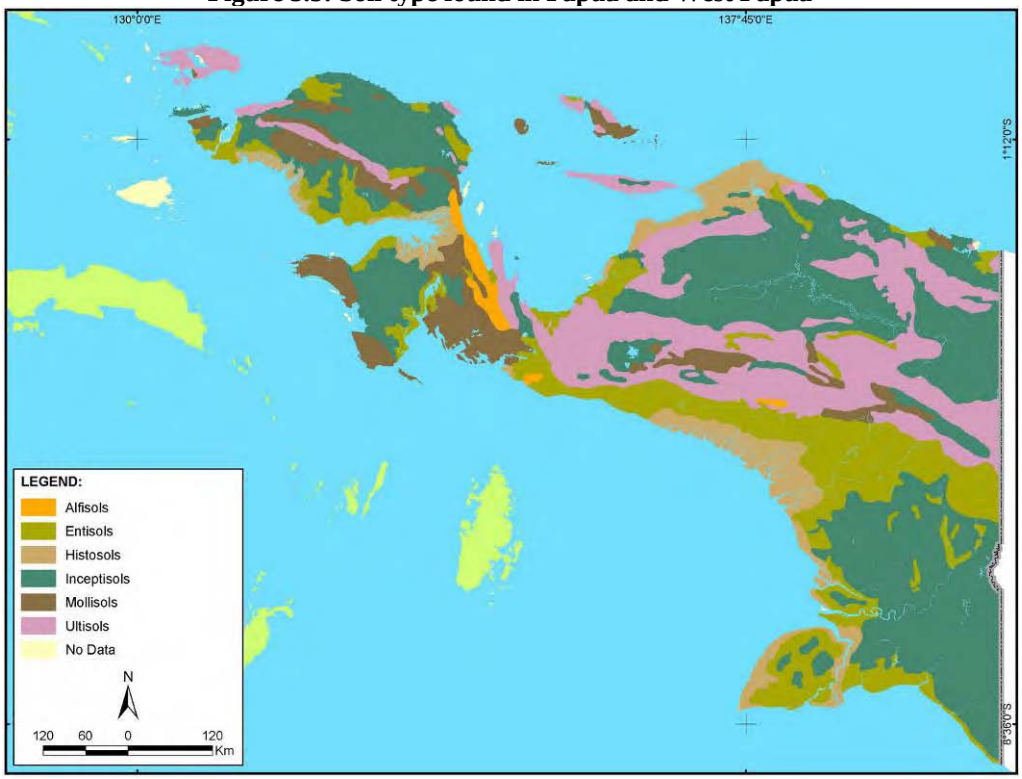
3.6 Soils

Knowledge on the distribution of soils and their properties is essential for managing agricultural production and other soil services. In Papua, most villagers have names for their soils and they are knowledgeable about soil properties. The following soils can be found in Papua.

Seven different soil types can be found in Papua: 1) Entisols (young soils); 2) Histocols (peat soils); 3) Vertisols (moderately weathered soils); 4) Mollisols (highly organic soils); 5) Alfisols (moderately weathered soils with high clay content); 6) Ultisols (acidic soils); and Inceptisols (moderately weathered soils with slightly developed horizons) (Figure 3.5). The more fertile soils (Mollisols and Inceptisols are found in the Mamberamo region and the Transfly region. This partially explains why oil palm and timber plantations are prominent in these areas.

Ultisols and Entiols are common in the highland region and are difficult to cultivate. To compensate for the poor soil fertility, Papuans in the highlands have developed a system of returning organic matter to the soil to add nutrients and maintain favourable soil physical properties.

Figure 3.5: Soil type found in Papua and West Papua

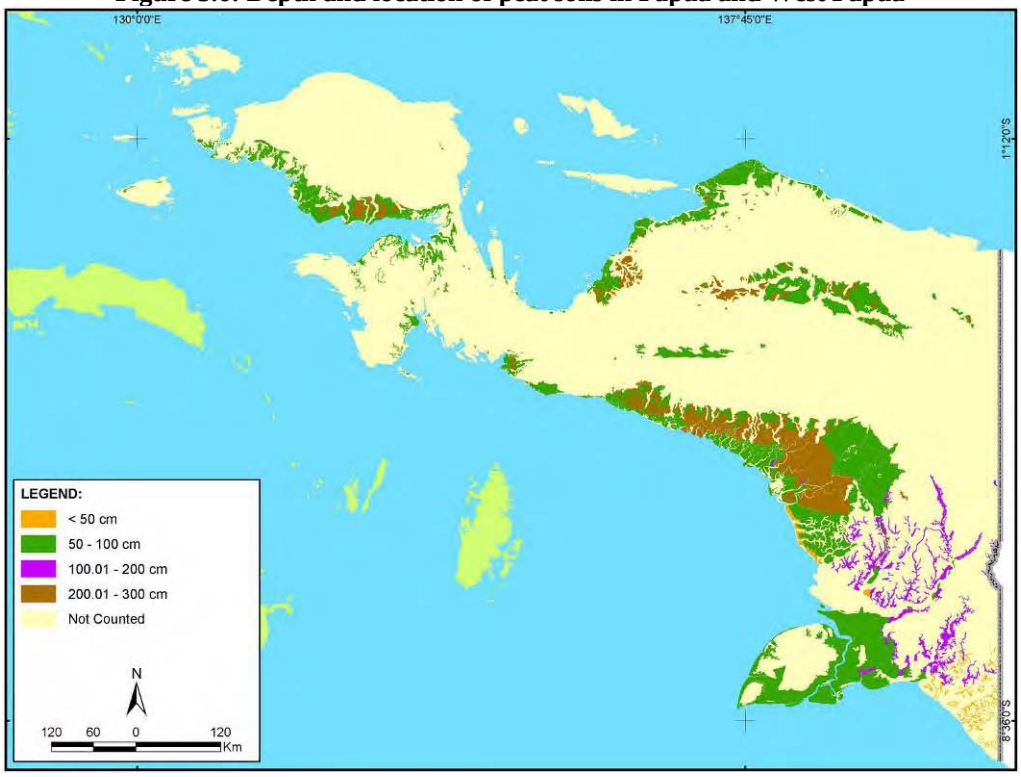


3.7 Peat soils

It is worth noting that approximately 6.9 million ha of Papua's land is comprised of peat soils. Most of these peat soils can be found within the districts of Asmat (1.5 million ha), Mappi (1.2 million ha), Merauke (1.6 million ha) and Mimika (745,592 ha), and Sarmi (647,257 ha) (Figure 3.6). The deepest peat soils (2-3 metres) can primarily be found within the districts of Asmat and Mimika.

It is worth noting that 85% of Asmat district is peat soils and 52% of these soils are between 2-3 metres deep. 45% of Merauke and Mappi districts total land area are also peat soils, while 33% of Mimika district is peat soils. These five districts, but especially Asmat district, may need special development plans that protect and conserve peat soils while allowing economic prosperity to develop.

Figure 3.6: Depth and location of peat soils in Papua and West Papua



3.8 Rainfall

Papua has unusually wet climates in both an Indonesian and a global context, with large areas of the mountains too wet and cloudy to support viable agriculture. Much of Papua province (~ 85%) regularly receives 2,500-5,500 mm of rain per year, and a few areas receive over 6500 mm of rain every year. A map of the provincial pattern of annual rainfall shows that high rainfall occurs along both the north and south sides of the main ranges in the districts of Boven Digoel, Yahukimo, Jayawijaya, Mimika, Tolikara and Asmat. High rainfall is also received around Faminggu Bay near the city of Agats in Asmat district (Prentice & Hope 2007).

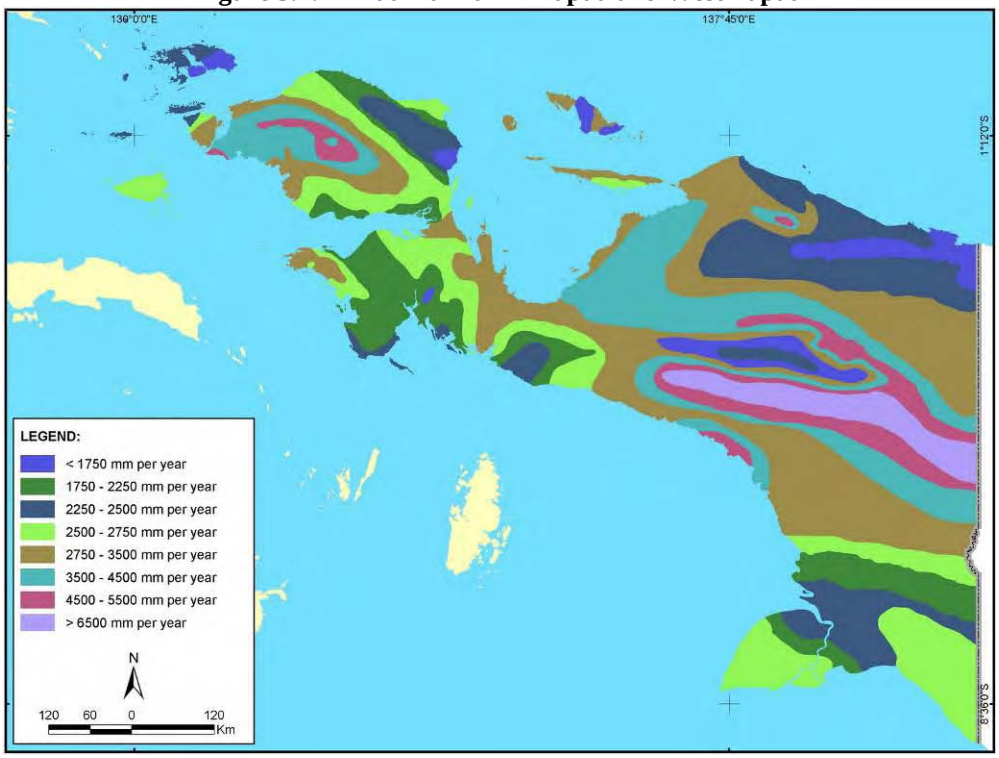
Rain shadows exist in some interior valleys (such as the Baliem), west of the city of Jayapura, and in the Trans-Fly of the far southeast. Rainfall is also slightly attenuated along the northern coast, from the mouth of the Mamberamo east to Jayapura. Much of the interior receives well in excess of 3000mm of rain per year (Prentice & Hope 2007).

Within restricted regions, such as on the south side of the Central Range along the Mt Jaya transect, rainfall increases with increasing altitude above the surface. However, higher annual rainfall is not necessarily associated with increasing altitude as the highest alpine areas have lower annual rainfall than the mountain flanks. Areas where annual rainfall is below 2,000 mm occur in the Sentani area because of the rain shadow from the Cyclops Mts and the southern third of the Merauke District (Trans-Fly) where the seasonal dry period is longest. There is also a zone of lower rainfall (<2,500 mm (in the lowlands north of the Central Range, where a rain shadow is developed (Prentice & Hope 2007).

Smaller intermontane basins north of the crest of the main range, such as Ik Sibil, Baliem, Hitalipa and Wissel lakes areas, are characterized by lower precipitation owing to a rain shadow effect. At the Wissel Lakes, the Weyland Mts block moisture from the west while the

Merauke Range provides a rain shadow from the east. These upland basins support dense populations. (Prentice & Hope 2007).

Figure 3.7: Annual rainfall in Papua and West Papua

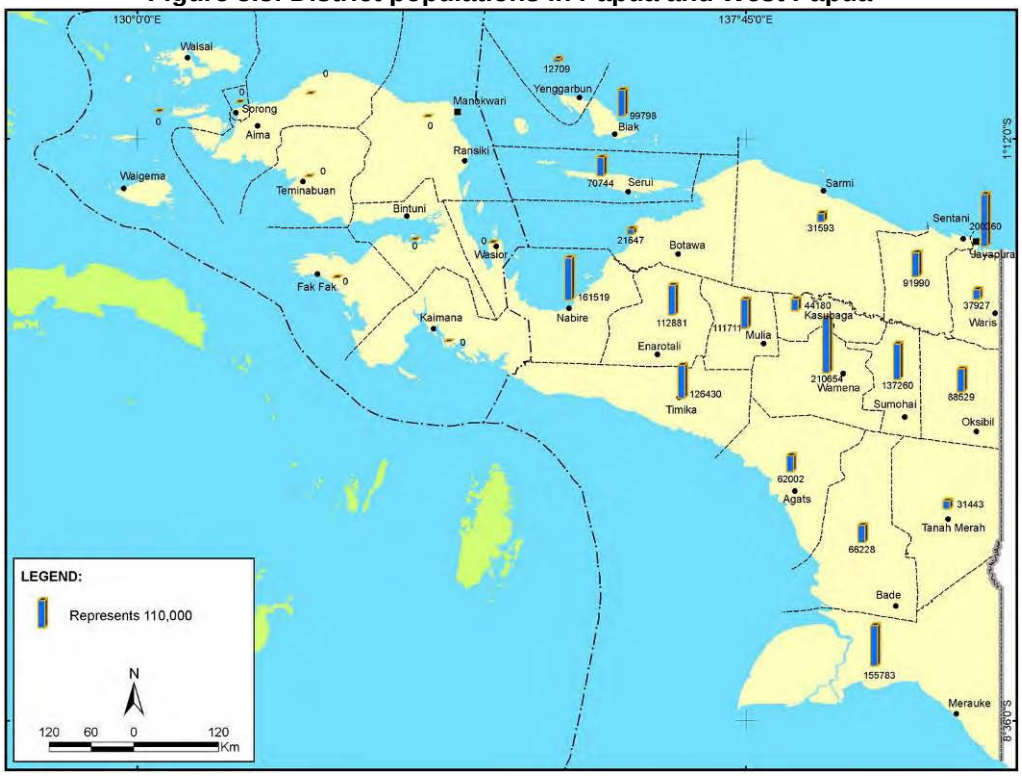


3.9 Human populations

Humans have been in the upland valleys of New Guinea for at least 30,000 years and have probably occupied the savanna plains that then connected the island to Australia for as much as 50,000 years or more (Filer 2007).

Statistical data of Papua's population for 2006 indicates that there are approximately 1.8 million people living in Papua province (approximately 17 people per km^2). Only around 500,000 people live in West Papua. Most of Papua's people either live in the coastal areas of the districts of Merauke (155,783), Nabire (161,519); or in the highland areas of Jayawijaya (210,654), Puncak Jaya (111,711), Mimika (126,430); Panai (112,881) and Yahuikimo (137,260) (Figure 3.8). Indigenous Papuan's tend to be dominant in the highland regions and primarily live in Enarotali, the Baliem Valley and around the Paniai lakes area.

Figure 3.8: District populations in Papua and West Papua



Population growth has been relatively rapid over the past three decades. Papua and West Papua had less than 1 million people in 1971 but now has about 2.6 million people. However, during that same period, the proportion of indigenous people has fallen from 96% to about 66%. Population growth is primarily attributed to Indonesia's transmigration program. This program resettled people from the populous islands of Java and Bali in less populated regions, such as Papua, and provided labor to large-scale projects, such as the Freeport mine, which required significant numbers of skilled, semi-skilled and un-skilled workers. Indigenous population growth in the highland regions is primarily attributed to the transmission of the sweet potato from South America to New Guinea.

Papua exhibits a much greater diversity of ethnicities and cultures than any other Indonesian province as it supports about 250 languages. Many of Papua's language groups are small and insular, with fewer than 1000 speakers. A few other languages (e.g. Dani, Asmat) are spoken by many (Figure 3.9).

Figure 3.9: Language map

3.10 Transmigration

Only 350,883 ha of land have been allocated for transmigration programs. This land primarily falls within the southern districts of Merauke (156,337 ha), Mimika (62,712 ha), and the northern district of Keerom (43,172 ha) (Figure 3.10). Approximately 75,200 families (almost 300,000 people) have been formally moved to Papua under Indonesia's transmigration program since 1977. Most of these people originally came from Java and Bali.

Although the area of land allocated for transmigration has been small, the transmigration program has been controversial, particularly since migrants and transmigrants are now beginning to outnumber indigenous populations.

Figure 3.10: Location of transmigration sites in Papua and West Papua

4. ECONOMIC, SOCIAL AND ENVIRONMENTAL PRIORITIES

This section provides information about the social, economic and environmental priorities of multiple stakeholders in Papua. These priorities were identified during stakeholder interviews and workshops.

4.1 Economic priorities

Papua's GRDP was estimated to reach Rp 22,237,444 million (US$ 2,443 million) in 2005, generating a per capita GRDP of over Rp 11 million (US$ 1,200), which is the fourth highest level of per capita GRDP of all provinces of Indonesia—only East Kalimantan, Jakarta and Riau have higher levels of per capita GRDP (BPS 2006).

In recent years, the Papuan regional economy also has experienced significant and sustained growth. Between 2001 and 2005, GRDP has grown at approximately 10% per annum (Table 4.1).

The regional economy has two dominant sectors, namely mining and agriculture (food crops, forestry, estate crops, animal husbandry and fisheries), which together account for 82% of the GRDP (Table 4.1). These two sectors play two distinct roles in the economy. The capital-intensive mining industry is the largest aggregate generator of income accounting for 71.6% of GRDP, while employing only 0.6% of the workforce. On the other hand, the labour-intensive agricultural sector, accounts for 75% of the workforce while only generating about 10.4% of the GRDP, due to low productivity (UNDP, 2005). This has resulted in the extremely low income levels for the vast majority of workers, thus accounting for the wide income disparity.

Table 4.1: Gross regional domestic product of Papua Province (2000-2005) (Rp 000 000)

Industrial Origin	2001	2002	2003	2004	2005
Agriculture	2,625,326.41	2,804,837.26	2,939,895.38	2,921,790.49	3,087,214.37
Mining and Quarrying	13,890,753.25	14,418,563.36	13,917,674.09	8,871,763.51	14,349,102.29
Industries	380,136.04	399,040.76	422,466.96	436,044.92	451,906.85
Electricity and Water Supply	28,583.54	30,279.12	33,119.91	35,575.55	38,426.40
Construction	671,741.84	741,929.96	798,646.66	869,350.13	934,882.96
Trade, Hotels, and Restaurants	730,568.37	801,921.54	873,067.94	943,450.02	1,020,808.67
Transport and Communication	506,761.97	574,317.64	687,364.74	783,403.48	891,034.60
Financial, Ownership & Business Services	176,858.81	182,014.09	191,128.47	223,671.17	244,566.83
Services	1,035,793.82	1,126,030.04	1,156,055.51	1,197,918.30	1,219,501.81
GDRB	20,046,524.06	21,078,933.76	21,019,419.67	16,282,967.57	22,237,444.78

Source: Papua Statistics book, 2006

In the future, Papua should receive greater share of the revenues from extractive industries, and have a greater say in how the industries are run and how revenues are reinvested. This is because Papua's Special Autonomy Law allows the Papuan government to obtain 80% of the total revenues generated from forestry, fishing and general mining, and 70% of the revenue generated from oil and gas.

According to a recent World Bank (2007) report, the governments of Papua and West Papua are primarily spending revenue generated from the above mentioned activities and from funds allocated by the national government to: 1) develop roads; 2) develop airports; 3) maintain roads; and 4) develop sea and river ports (Table 4.2). Funds have also been allocated for community development and settlement, water management, energy, sanitation and telecommunications.

Table 4.2 : Estimated expenditures for 2008 in Papua and West Papua

Description	Infrastructure Expenditures in billion of Rupiah				Totals in USD millions
	National (APBN)	Province (APBD)	Kab/Kota (APBD)	Total Nat/ Prov/Kab/ Kota	
Routine Expenditures:					
O&M (Road betterment and maintenance)	242.1	0.0	9.0	251.1	27.6
Development Expenditures:					
Road Construction	316.6	1.0	49.0	366.6	40.3
Water and Sanitation	0.0	11.0	36.0	47.0	5.2
Airport	321.7	0.0	0.0	321.7	35.4
Port (sea and river)	174.6	0.0	0.0	174.6	19.2
Land Transport (Buses/Terminals,etc)	11.0	0.0	0.0	11.0	1.2
Energy	0.0	55.0	4.0	59.0	6.5
Telecommunication	0.0	40.0	0.0	40.0	4.4
Water Management/	74.6	0.0	0.0	74.6	8.2

Irrigation					
Social Expenditures:					
Settlement	0.0	21.5	26.5	48.0	5.3
Communities	0.0	44.0	57.0	101.0	11.1
Total IDR	1,140.6	172.5	181.5	1,494.6	164.4
Total USD Millions	125.3	19.0	19.9	164.2	

Source: World Bank 2007.

4.1.1 Mining

As mentioned above, mining is generating nearly three quarters of Papua's revenue and is consequently a significant priority for the Papuan government. Papua has large potential reserves of gold, copper, natural gas and oil and active mines, such as PT Freeport (a large copper and gold mine) are able to generate considerable income for both the provincial and the central government. PT Freeport is thought to have generated over US$1 billion in revenue, primarily for the central government; and the new BP Tangguh gas project, located in Bintuni Bay (West Papua), is predicted to generate US$8.7 billion for the central government and US$3.6 billion for the government of West Papua over the next 20 years (DTE, 2005).

Figure 4.1 Metal distribution map

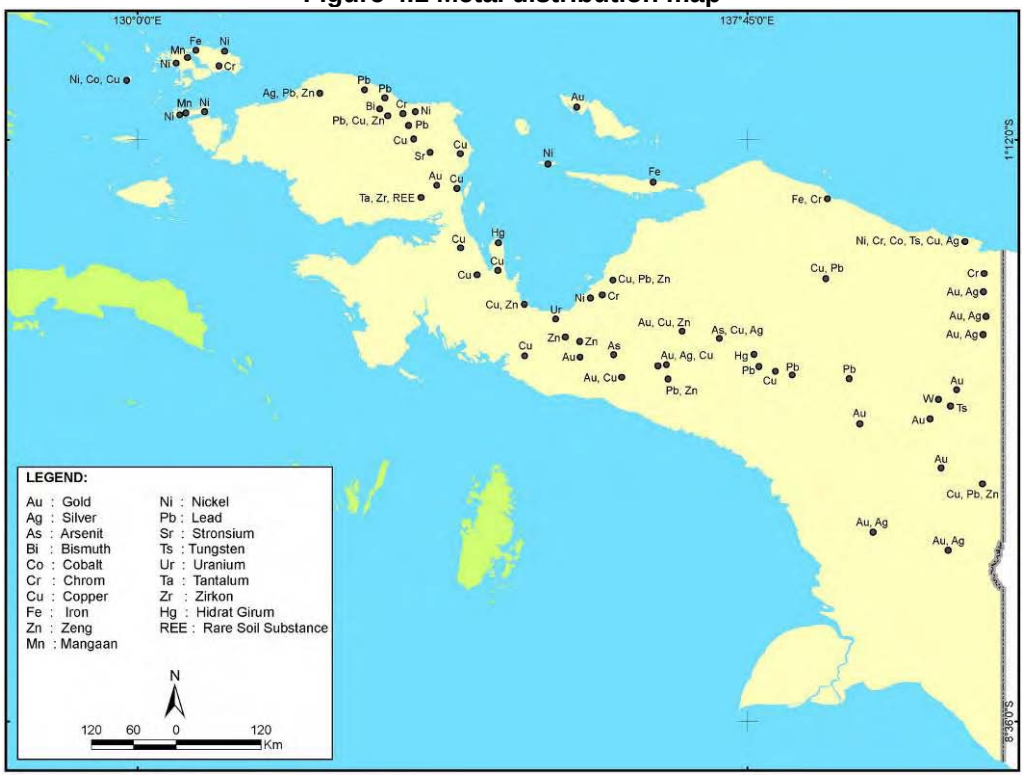


Figure 4.2 Coal potential map

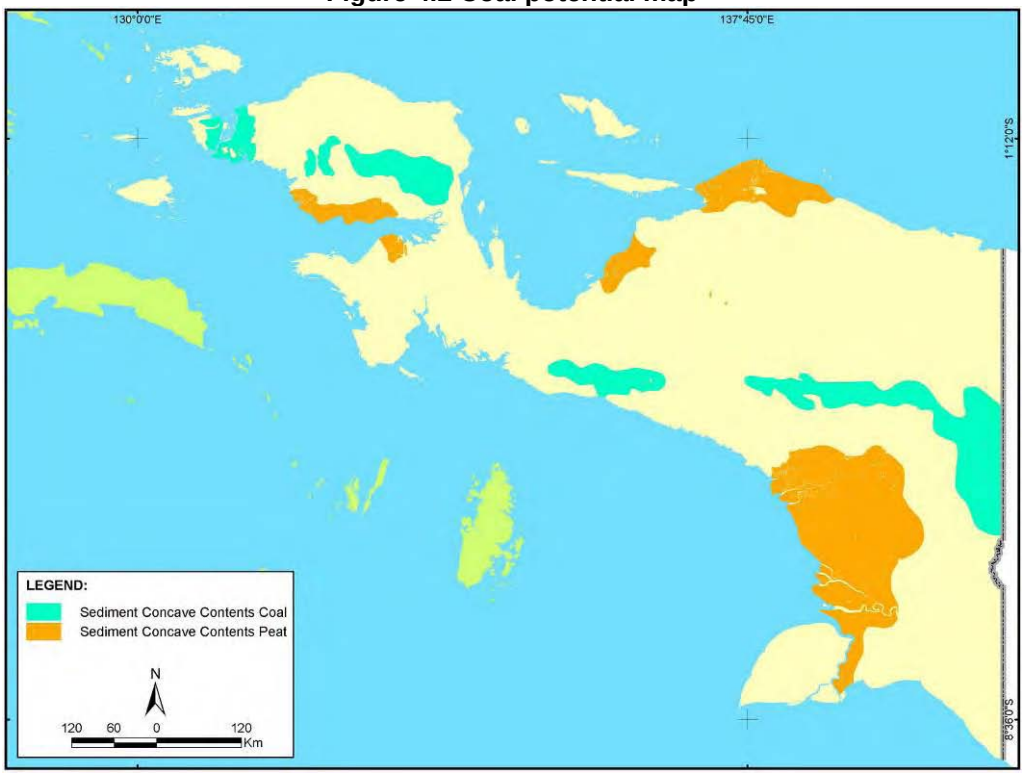


Figure 4.3 Hydrocarbon potential map

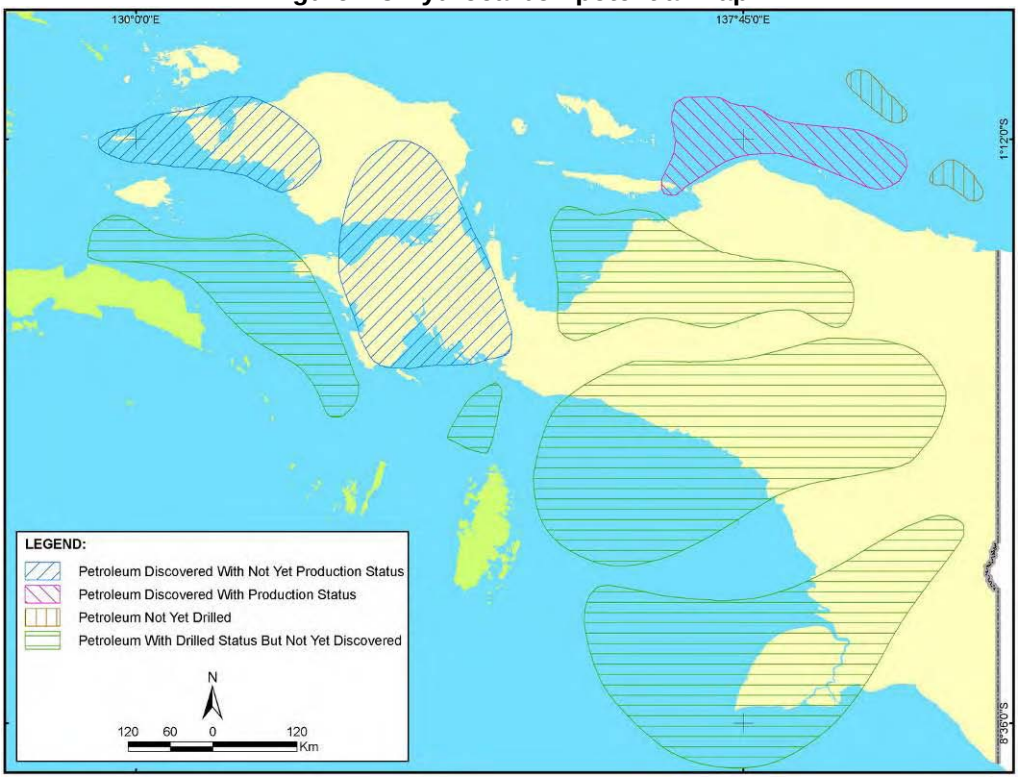
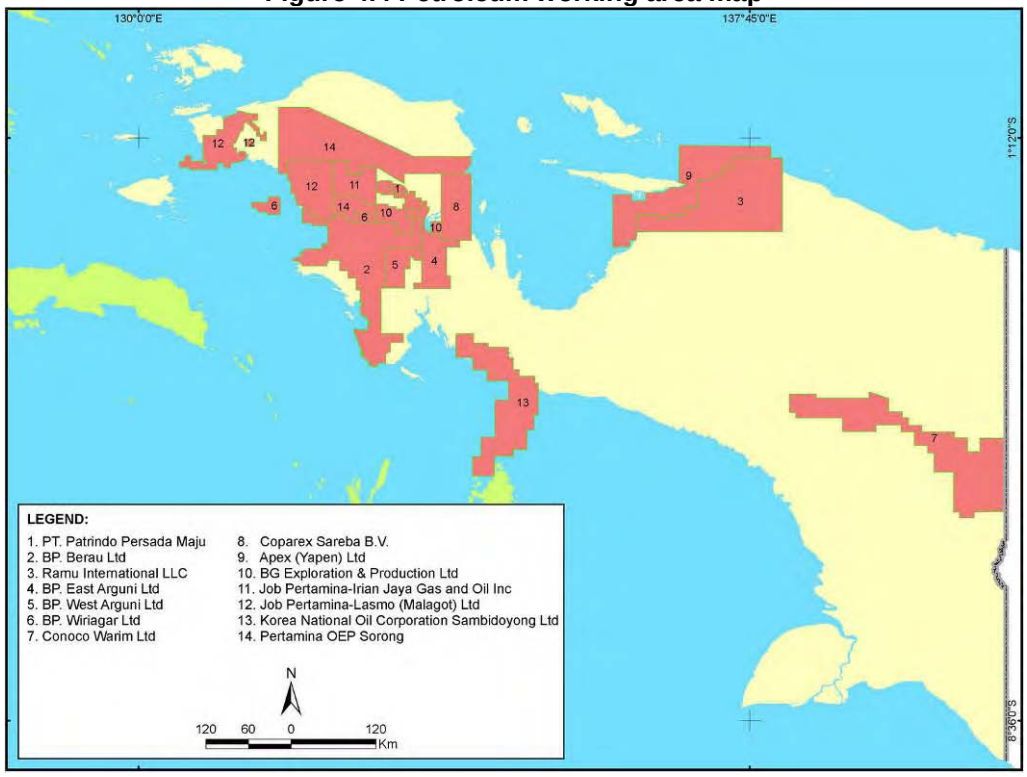


Figure 4.4 Petroleum working area map



PT Freeport is Indonesia's single largest taxpayer – $1.2 billion in 2005 alone. However, the redistribution of royalties and taxes remains centrally controlled and is a contentious issue. Figures for 2006 indicate that while Freeport contributed US$ 1.1 billion to central government coffers in the form of taxes and royalties, Papua is only guaranteed a percentage of the royalties (some 80% amounting to US$ 65 million) which disbursed to Papua by the Ministry of Finance. Central government retains the portion defined as taxes; and even for the disbursement of the percentage of the royalties to Papua, there are complaints about slow and late disbursements.

Spatial analysis carried out by SEKALA indicates that around 6.2 million hectares of forest land have been allocated to mining companies in the province of Papua alone. Another 13.4 million hectares of forest land has been allocated for exploration. The majority of this land (62%) falls within protected and conservation forest (Table 4.3). Almost 19 percent of mining concessions are located within mountain forest area, and more than 64 percent of mining concessions are within lowland forest.

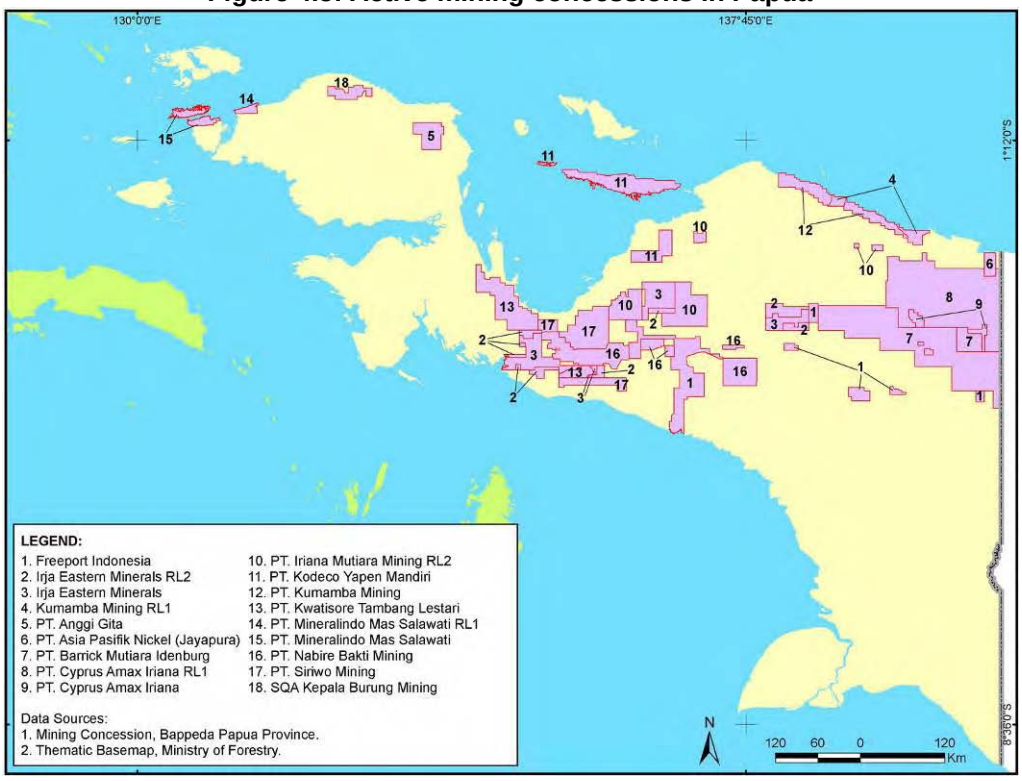
Table 4.3: Mining concessions located in forest categories

Mining	HSAW	HL	HP	HPK	Total
Papua Total	**3,858,714.98**	**8,484,846.39**	**4,579,479.18**	**2,756,322.31**	**19,679,362.86**
Actual	1,039,070.09	3,082,847.82	**1,226,646.17**	924,758.50	6,273,322.58
Exploration	2,819,644.89	5,401,998.57	3,352,833.01	1,831,563.81	13,406,040.28

Most of the mine concessions are situated in the northern part of Papua province and are prominent in the districts of Sarmi, Keerom and Mimika. The Freeport mine overlaps the districts of Jayawijaya and Yahukimo. Most of these companies are mining gold and copper. Mining companies holding the largest land areas are: PT

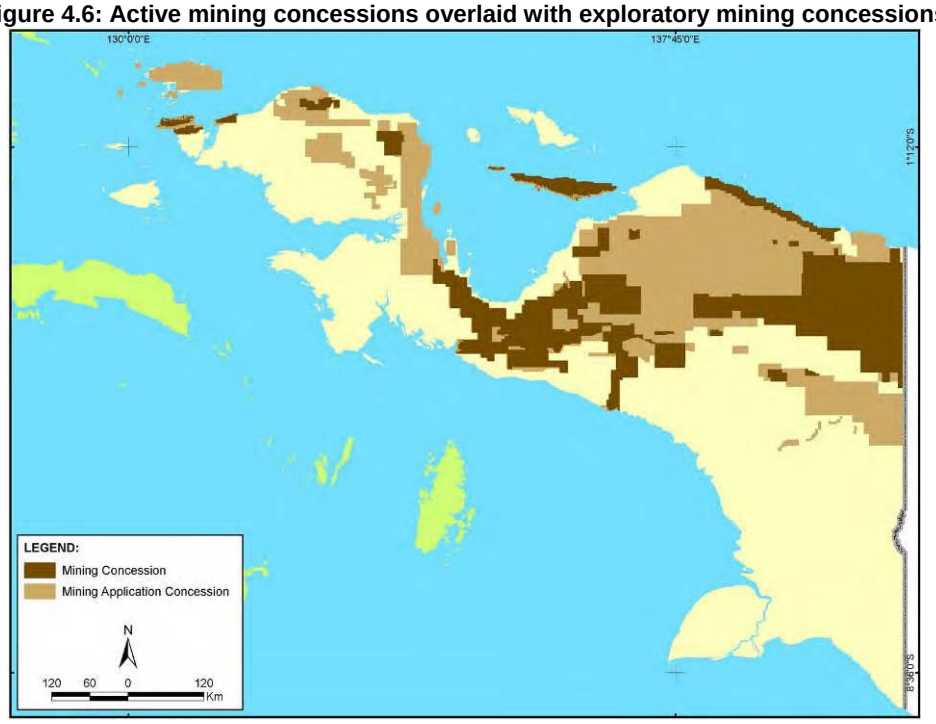
Cyprus Armax Iriana (1.4 million ha) and PT Barrick Mutiara Idenburg (1.4 million ha) and PT Freeport (811,906 ha). All three companies are mining gold (Figure 4.5).

Figure 4.5: Active mining concessions in Papua



Exploratory mining leases are prominent in the northern districts of Sarmi, Waropen, Jayapura, Keerom, Jawawijaya, Nabire and Paninai. These mining leases cover the great majority of the Mamberamo basin. They also overlap considerably with many of the active mining concessions (Figure 4.6).

Figure 4.6: Active mining concessions overlaid with exploratory mining concessions



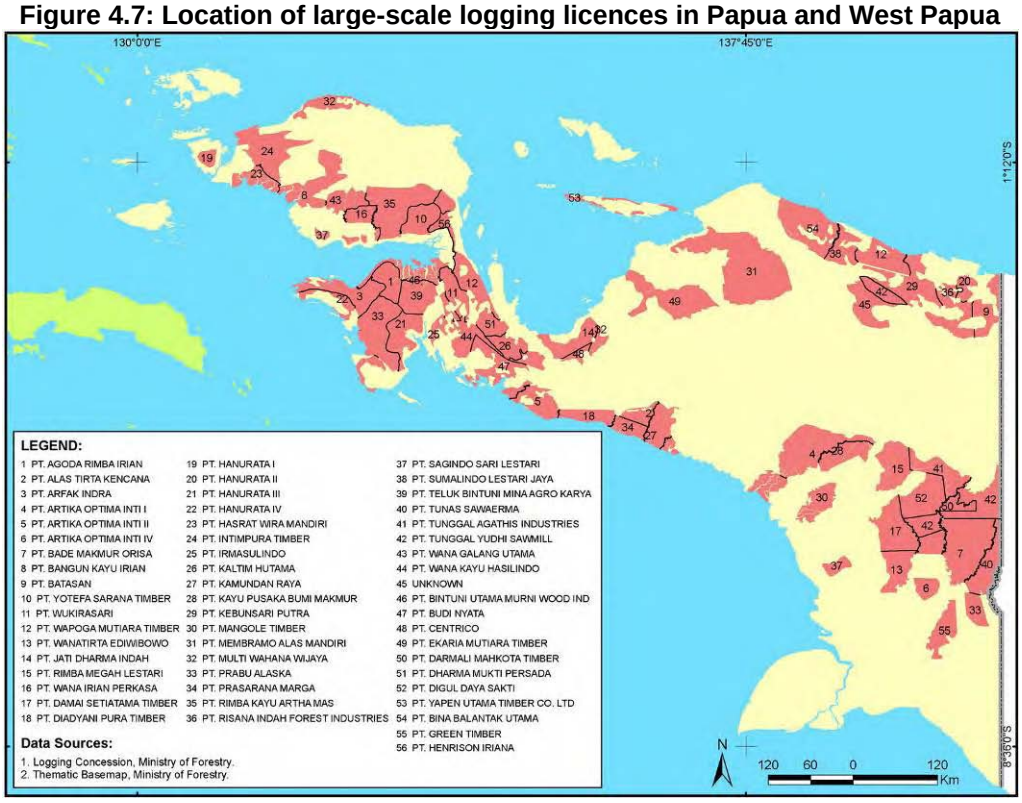
4.1.2 Logging

Large scale logging is a priority of the central government, however, the provincial government of Papua prefers to facilitate the development of community based logging in Papua province.

57% of Papua's production forests have been allocated to around 38 large-scale timber concessions which cover over 9.2 million hectares of land. 64% of the forests allocated for large-scale logging are lowland forests. Logging concessions primarily fall within the northern districts of Sarmi (1.3 million ha), Nabire (327,456 ha), Waropen (427,225 ha) and Keerom (364,350 ha); and the southern districts of Mimika (675,156 ha), Asmat (654,831 ha), Boven Digoel (2.1 million ha) and Mappi (439,775) (Figure 4.7).

Many (approximately 20) of these timber concessions have become inactive in recent years and timber production obtained from these concessions has consequently declined. The Papuan provincial government wishes to review all of the HPH concessions allocated in Papua province and to revoke the permits of concessionaires who are no longer active. It then wishes to establish logging models that are more community based and allow local people to benefit from logging. A draft provincial law has been drafted to facilitate this process and this law is currently being reviewed by the Indonesian Ministry of Forestry.

Figure 4.7: Location of large-scale logging licences in Papua and West Papua



4.1.3 Oil palm

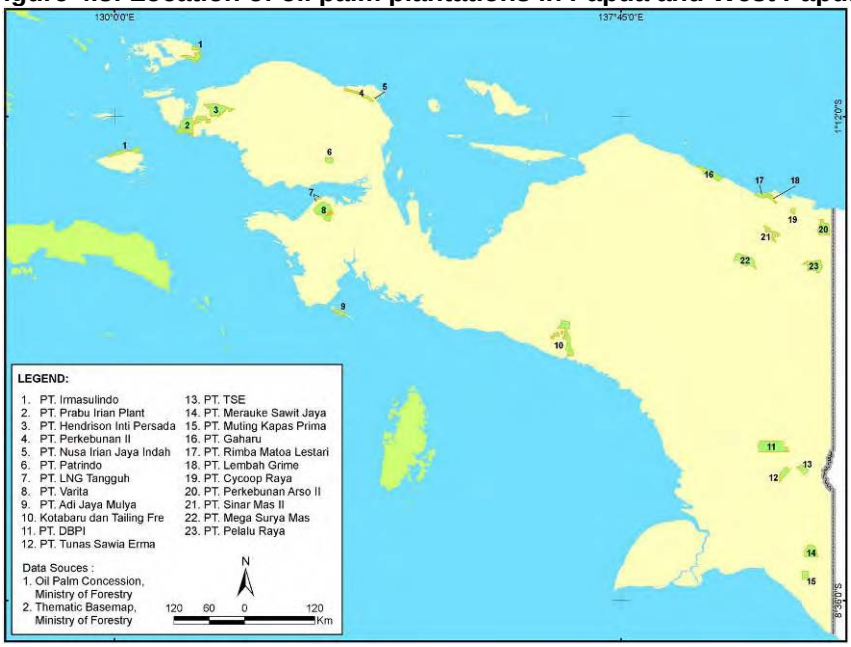
Oil palm is a priority of the central government and the government of Papua. Oil palm plantations have been growing rapidly in Papua over the last 10 years. In 1991, there were around 11,367 hectares of oil palm, but in 2005 there were around

50,000 ha of oil palm plantations in Papua province alone. Most of the oil palm plantations established in Papua lie in the north-east, near the city of Jayapura, and in the south east, near the Papua New Guinea border (Figure 4.8).

Indonesia is expected to establish another 5.6 million hectares of oil palm over the next 13 years. Most of this expansion is expected to first occur in Sumatra and Kalimantan followed by Papua. The Indonesian government is keen to develop oil palm plantations in Papua and is offering investors the opportunity to establish up to 200,000 ha of oil palm rather than just 100,000 ha in Sumatra and Kalimantan. Over 50,000 ha of oil palm has already been planted in Papua and permits have already been allocated to develop another 500,000 ha. The provincial governor has declared that 3 million hectares of land is being set aside for oil palm plantations with the aim of making Papua the largest palm oil producer among the provinces of Indonesia (Kompas, 12 May 2003).

Most of the allocated lands slated for conversion to oil palm in Papua province are covered with primary lowland forests and evidence from other parts of Indonesia suggest that proposals for plantation development have sometimes been a pretext for timber companies to clear-fell forests and then abandon land. While oil palm is able to confer important economic benefits in terms of foreign exchange, revenue and employment expansion is a source of concern because it results in outright forest conversion, biodiversity loss and carbon emissions. Great care needs to be taken when allocating land for oil palm and plantations should ideally be established on degraded mineral soils rather than on forested land or peat soils.

Figure 4.8: Location of oil palm plantations in Papua and West Papua

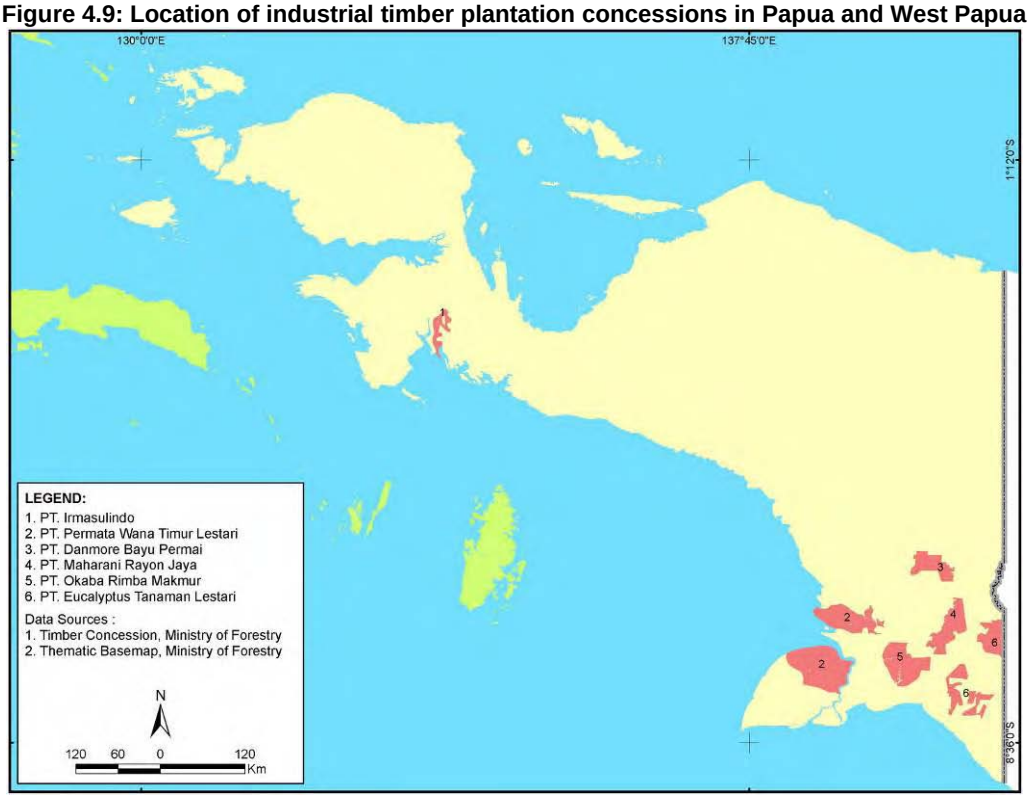


4.1.4 Industrial timber plantations

Only 150,507 ha of land have been allocated to industrial timber plantations to date in Papua province. These plantations are situated within the southern districts of: Merauke (112,351 ha), Mappi (23, 802 ha), Boven Digoel (6,425 ha), Kaimana (7,925 ha) (Figure 4.9).

Most industrial timber companies are expanding industrial plantations in Sumatra and Kalimantan rather than Papua and the Ministry of Forestry has released plans to establish up to 9 million ha of new industrial timber plantations in the former two provinces in collaboration with local communities. These new plantations are expected to reduce the Indonesian timber industries reliance on tropical forests to meet demand for timber products. Industrial timber plantations are supposed to only be established on degraded land, however, plantations often replace natural forest. This is likely to have been the case in Papua. Because most of Papua's land area is forest, the Ministry of Forestry is considering granting special land allocation criteria for Papua that would allow areas with high timber stocking densities to be converted to industrial timber plantations. This could potentially make expansion of industrial timber plantations in Papua more attractive to companies.

Figure 4.9: Location of industrial timber plantation concessions in Papua and West Papua



4.1.5 Agriculture

The Papuan provincial government wishes to develop agriculture, particularly in the mountainous highland regions. This is primarily because the contribution of the agricultural sector to total GDP in Papua has increased over the years and in 2002 its contribution to total GDP reached 8.8%, or about 2.1 trillion rupiah at current prices.

Agricultural commodities produced in Papua include: rice, corn, cassava, potato, soybean, peanuts, vegetables, and fruits. Simply processed foods are also included in this sector, such as sago and sticky rice. Commodities for husbandry include

poultry, pigs, and cows. Commodities or cash crops agriculture in Papua include coconuts, nutmeg, cacao, oil palm, cloves, coffee, rubber and cashews.

Agricultural practices found in Papua

People from Papua, even if they depend on forest products for their livelihoods, mostly rely on cultivated crops for their subsistence. Different agricultural practices are used in the highlands, lowlands and coastal areas.

In the highlands, people mainly cultivate tuber crops, mostly sweet potatos (Ipomoea batatas), cassava (Manihot esculentus), yams (*Dioscorea sp*.) and taro (*Colocasia esculenta*). But many other crops are planted, such as bananas (Musa sp), red Pandanus (*Pandanus conoideius*), nut pandanus (*Pandanus julianettii*) and a considerable number of vegetables, which complement the nutritional intake from tubers.

In the lowlands, (primarily in the Mamberamo watershed) sago is the primary crop and tuber cultivation is normally a secondary crop. Yam, cassava and sweet potato are not staples and are cultivated only to add variety to villagers diets. Bananas and coconuts are usually planted in mixed gardens. Agriculture is usually supplemented by hunting, fishing and gathering.

In the coastal areas and islands, shifting cultivation takes place with taro and yam as staple foods supplemented by gardens of mixed crops (e.g. cassava, banana, sweet potato). Recently plantations of oil palm and cocoa have been developed in the coastal areas and lowlands. Coastal people tend to catch fish as their principal daily activity and practice agriculture as a side activity. Gathering sago is also an important activity for coastal societies.

Transmigration and other developments have led to many changes in agricultural practices over the past few decades (i.e. cultivation of rice and cash crops such as coffee, cacao, cloves, coconuts, and walnuts). Production of these new crops remains low and transportation costs limit the sale of most products to local or regional markets (Boissiere and Purwanto 2007).

4.1.6 Roads

The expansion and maintenance of Papua's road network has been a major development priority for both the central and provincial governments over the course of the past decade.

According to the World Bank, approximately Rp 366.6 billion (USD 30.3) has been allocated for road construction and Rp 251.1 billion (28.6) has been allocated for road maintenance for the 2008 financial year (World Bank 2007).

Three major roads have been developed to date (Figure 4.10). The first links the city of Nabire, located on the north-west coast of Papua to Enarotali (one of the more populated highland areas). This road is 262 km in length and only 19% of the road has been asphalted. The road is estimated to have already cost USD 16 million.

The second road links the city of Jayapura to Wamena and is supposed to link Wamena up with the city of Mulia in the centre of the highlands, attempts have been made to open up a road between Jayapura and the highlands (Wamena and Mulia) but this was never completed nor opened to traffic. If the entire road is built it will be 733 km long and was estimated to cost USD 44 million. Presently, only 21% of the road has been asphalted and 35% of the road has again been swallowed by the

forest. There is a road connection between Wamena and Mulia (but only accessible by 4x4 during the dry season). The stretches of road constructed between Jayapura and Wamena were never maintained and now only remains around certain towns and settlements, but is impassable and cannot be used as a transport artery.

Figure 4.10: Location of existing and planned roads in Papua and West Papua

The third major road links the city of Merauke in the far south to the northern cities of Tanah-Merah and Waropoko, which are both located along the PNG border. This road is 558 km in length and is 37% asphalted. The road is estimated to have cost around USD 33 million.

A road network has also been developed in the district of Mimika (where PT Freeport is located) and PT Korindo (a logging and oil palm company) has developed a road network in Boven Digoel district. In other words, road developments are closely related to large scale extractive activities: mining, logging and oil palm.

Table 4.4: Major road developments in Papua province

Principal Connections in Papua Province	Length In km	Condition			Est. cost (USD mill)
		Asphalt	Non-asphalt	Forest	
Nabire-Wagete-Enarotali	262	19%	81%		16
Jayapura-Wamena-Mulia	733	21%	43%	35%	44
Merauke-Tanah Merah-Waropoko	558	37%	59%	4%	33

Distances taken from: Papua Public Expenditure Analysis/Overview Report World Bank, 2005. Cost estimate based on USD 100,000/km (ballpark figure based on – World Bank – A Brief Review of the Infrastructure Expenditure Priorities for Papua and West Papua in 2008.)

According to a World Bank Infrastructure report (2007), Papua's roads are in substantially worse condition than those in the rest of Indonesia. The 2,300 km of national roads represent about 7% of the Indonesian national road network and about 40% are considered to be in good and fair condition compared to the national average of about 80% in good and fair condition.

In addition to asphalting and finishing the above mentioned roads, the Papuan provincial government has a number of additional road plans.

- A road linking up Enarotali with Timika and then on to Mulia in the highlands;
- A road linking up Tanah Merah with Jayapura
- A road linking Nabire to Waren on the north-west coast.
- A road network of 91km of 6 lane 'toll-road quality' roads in the vicinity of the provincial capital. This would be known as the Jayapura Ring Road.

A recent spatial plan for the Mamberamo region also proposes a major road network that will circle the Van Rees and Foja Mountains. Previously, a road was proposed to link up the city of Wamena with the city of Agats in Asmat district. This road plan would have gone straight through the peat swamps of Asmat district, which would have been a major engineering feat. It fortunately seems to have been dropped from recent road plans.

In recent years, the central government has also promoted a 'road for logs' deal in which the central government would grant a foreign consortium a contract to construct the trans-Papuan highway for the length of 11,280 km. In return, the developers would be granted rights to all of the logs within five kilometers on both sides of the highway and they would be given the rights to manage plantation and other forestry projects in the surrounding areas. This was supposed to commence in 2001, but has not yet materialized.

4.1.7 Air and sea transport

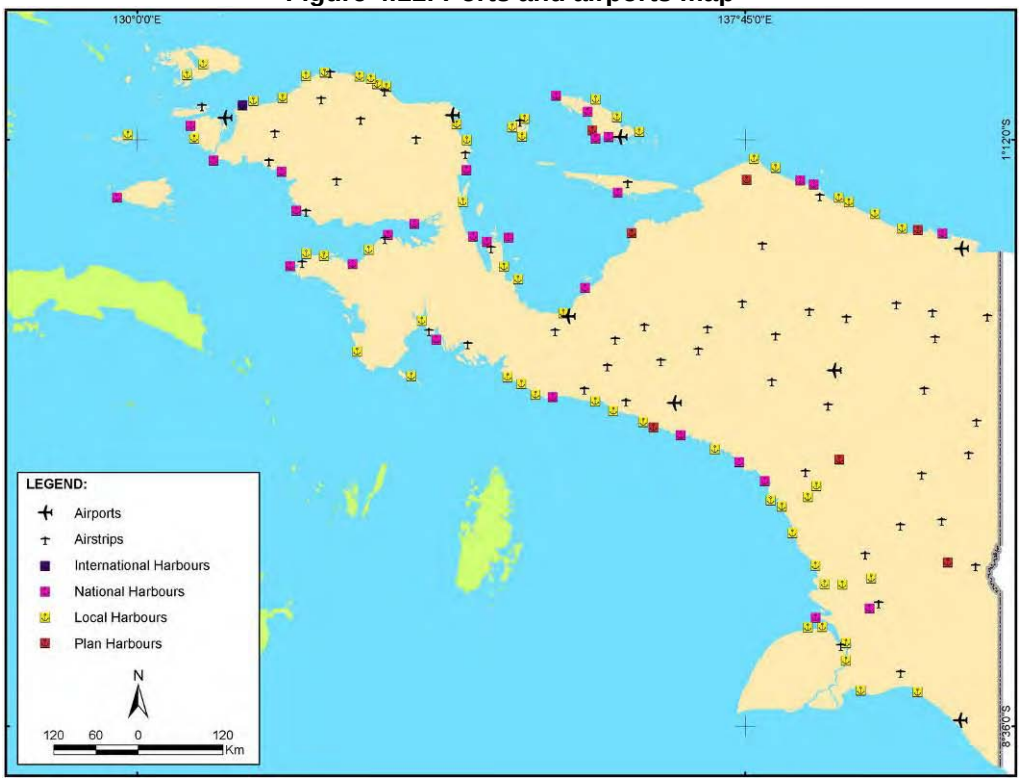
The Papua provincial government recognizes that air and sea transport are also viable options and considerable funding has been allocated to both. According to the World Bank (2007) Rp 321.7 billion (US$ 35.4 million) has been allocated for airport developments and Rp 174.7 billion (US$19.2 million) has been allocated for sea and river port developments.

Papua province already relies greatly on sea /river (water) transport and it has developed a number of ports along the coastline and along navigable stretches of river going deep inland. It does not, nevertheless, have an international port. An international port is only found in West Papua province near the city of Sorong. An international port has been proposed for the city of Jayapura.

Airports are also scattered across the province and can be found at the city of Jayapura, Arzo, Barmi, Nabire, Timika, Wamena, Tanah Merah and Merauke. Around 400 small airstrips have also been established throughout the province.

The provincial department of transport plans to upgrade and construct 4 international airports in Papua capable of landing large commercial jet airliners (>3000m runway length).

Figure 4.11: Ports and airports map



4.1.8 Fisheries

Papua's marine resources are plentiful; much of its marine industry is orientated towards export (primarily to Japan and Europe), including tuna, crabs, sea cucumbers, pearls and aquarium fish (Figures 4.12 & 4.13). The Indonesian government and the Papuan government both appear to be encouraging investment in fisheries in the seas of Papua and the rest of Eastern Indonesia because it views these seas as being underexploited. The fishing industry does, nevertheless, need to be carefully managed and regulated to ensure that Papua's seas are not over-exploited. The provincial fisheries department has the view that the Arafura Sea is already over-exploited and WWF Reports draw the same conclusions with respect to tuna – they are also not very positive about the way the fish is handled which has already led to import bans from Europe for tuna from Indonesia because it doesn't meet EC health regulations.

The use of destructive fishing practices (including traditional fish poisons, cyanide and explosives) appears to be widespread in Papua. Fishing with explosives produces high yields but shatters coral skeletons and transforms coral reefs into rubble zones. Cyanide is commonly used to capture aquarium fish for export. Mortality rates in the live fish trade are very high—an estimated 80% for aquarium fish and 50% for live food fish (Filer 2007).

Figure 4.12: Fisheries potential map – Demersial or Demersal fish (fish found living on or near the bottom of the sea).

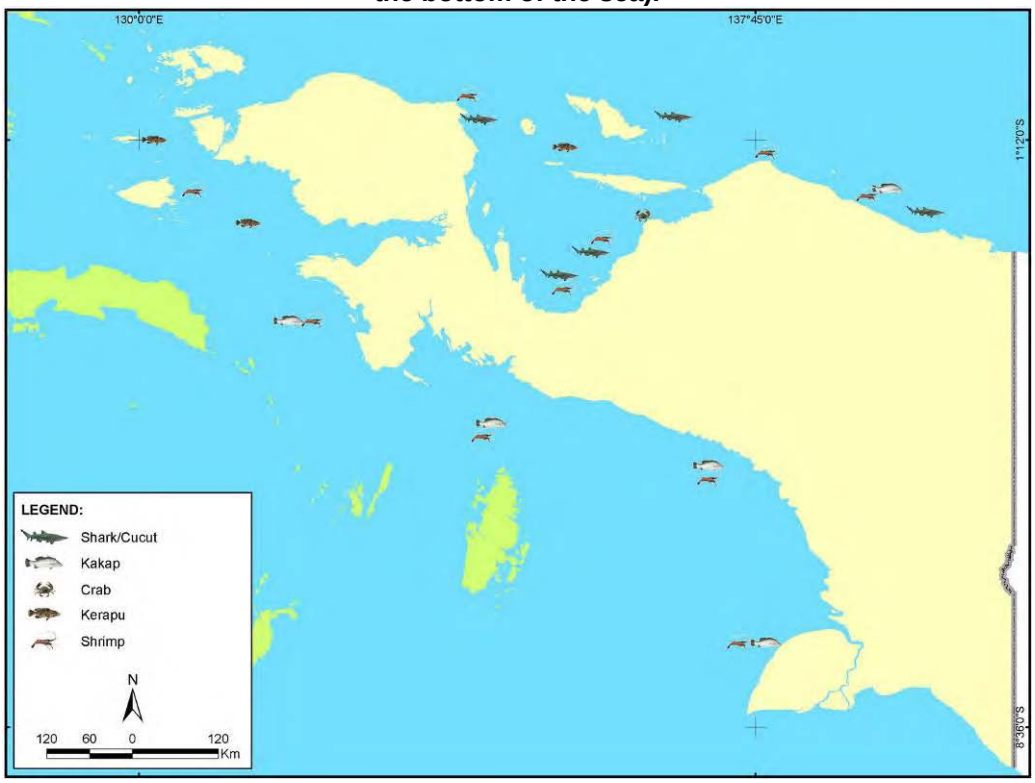
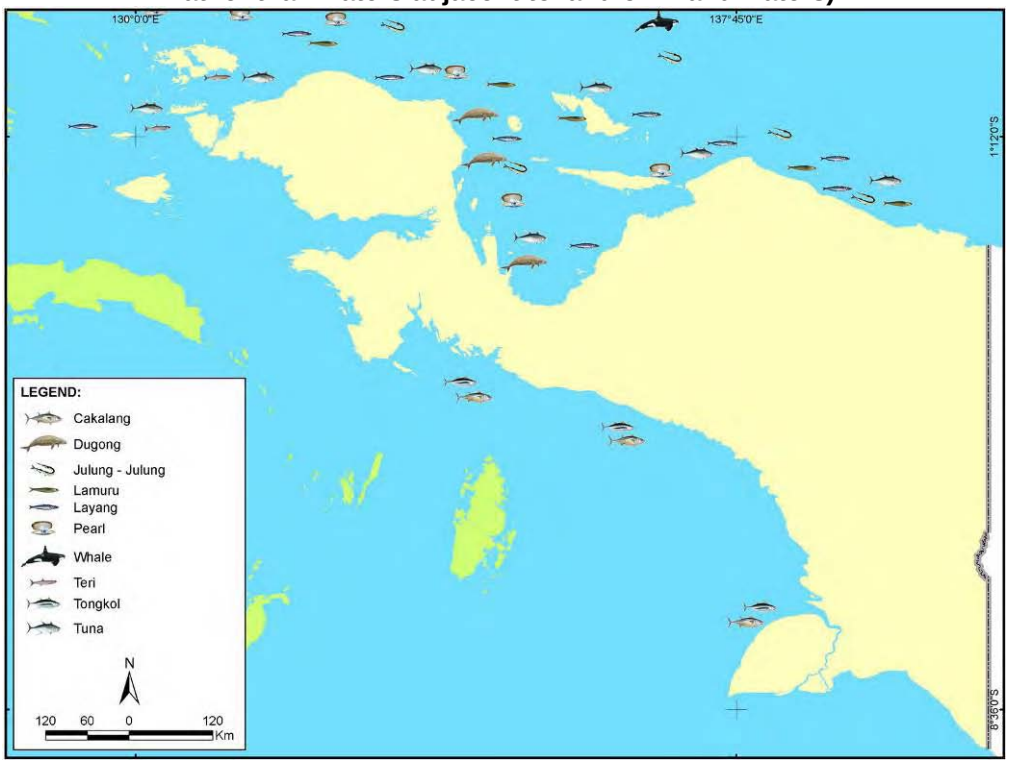


Figure 4.13: Fisheries potential map – Pelagic fish (living at the surface of open oceans or seas rather than waters adjacent to land or inland waters)



4.1.9 Electricity

Electricity is a priority for the Papuan government. To reflect this, it allocated approximately IDR 77.4 billion (USD 8.5 million) for electricity developments in 2006.

According to the World Bank, the majority of people in Papua do not have access to electricity. In 2005, PLN supplied electricity to 190,000 households or around 25% of households in the provinces, far below the average national electrification rate of 65%. At least 570,000 (75%) households need proper electricity access in the near future.

Current electricity supplies are not suitable as they are supplied by several PLN isolated systems, of which power is mostly generated from high cost diesel generating plants. In 2005, the total dependable capacity was around 93 MW while at the same period the peak demand was 106 MW resulting in a system with deficits and no reserve capacity for maintenance. Of the 93 MW, more than 97% of the capacity is based on costly oil-based power plants. The networks are not interconnected; there are several major isolated networks in Jayapura, Biak, Sorong, Merauke, Manokwari and Timika. Jayapura is the largest network in the provinces and absorbs 35% of the electricity produced.

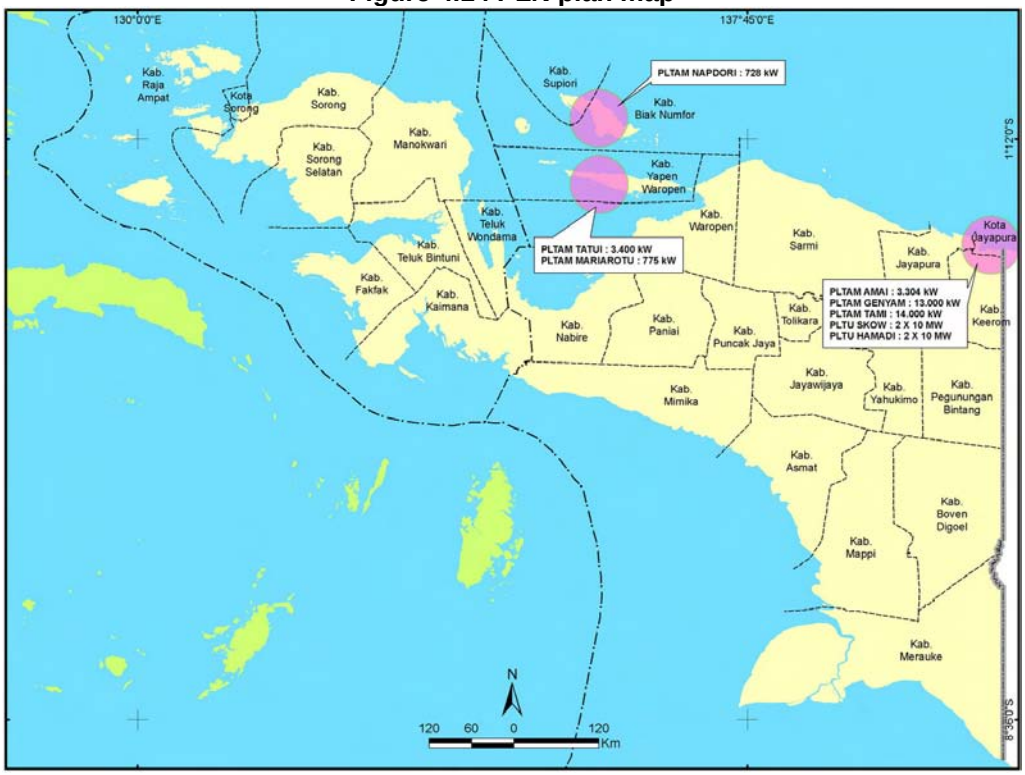
Current electricity supply has focused on serving the urban population rather than on households that live far from the PLN grid, including remote areas. Papua province is estimated to need another 20 MW of additional capacity to support households that are far from the electricity grid and those in remote areas.

There are several mining, and oil and gas areas that generate large amount of captive power for their industries and the settlement where the employees live. The Freeport mine, for example, produces 250 – 380 MW, more than twice of the entire province's peak demand, while the surrounding areas lack electricity supply.

PLN plans to build two 10 MW coal power plants in Jayapura in 2008 and 2009. Through an ADB loan, PLN is also constructing microhydro power plants with a planned total installed capacity of 23 MW in Manokwari, Serui, Depabre, and Jayapura. These projects will cost PLN around IDR 655.4 billion (USD 71 million).

The provincial government has also considered a 'Mamberamo mega-project' which would involve construction of a series of dams in the Mamberamo region to generate approximately 20,000 MW of electricity mainly for mining and smelting. This plan is currently on hold but it is still alive and was discussed extensively in a provincial spatial plan recently prepared by PT Aditya engineering consultants for the Mamberamo region.

Figure 4.14 PLN plan map



4.1.10 Telecommunications

Telecommunications infrastructure to date in Papua is modest with many areas still outside mobile coverage and fixed line and broadband access only in large population centers. Fixed telephone lines and mobile coverage can be found in major towns and cities. Satellite access is possible almost everywhere but costly and limited in its capabilities.

The government plans to construct an Eastern Palapa Ring (fibre network) to allow broadband internet establishment in major population centres and it may be possible to connect more remote places up to 35km for mobile phone access with the use of yagi antenna on bamboo poles. The Governor has already expressed an interest in developing and ICT in education strategy.

Cell phones and improved internet connections could have a major impact on improving livelihoods – and also on opening up isolated areas. Access to cellular phones (using pre-paid cards, etc.) can make a real difference in also allowing poor people to break out of isolation; hence improving coverage to isolated areas becomes very important (World Bank 2007).

4.1.11 Tourism

The Papuan provincial government has included building up tourism in the province among one of their top development priorities. Key tourism sites are the Asmat region, the Mamberamo region, Wamena, Lorentz World Heritage Site and Wasur National Park.

4.1.12 Trade

The Papuan provincial government plans to develop Biak, Timika and Yahukimo as special economic regions for international trade.

4.2 Social priorities

In September 2006, the Governor of Papua issued a call to development agencies requesting their support for his development vision of the Province, particularly highlighting 4 priorities:

- Reduction of poverty through community-based development focusing on nutrition, health, education and local economic development.
- Development of macro infrastructure
- Improvement of Governance by strengthening individual and organisational capacities.
- Support for sustainable natural resources management.

Papua is a paradox in its under-development. On the one hand the Province has extensive natural resources reserves and significant public expenditure budgets, and even before special autonomy and decentralisation, Papua was the second richest province in fiscal terms.[3] On the other hand, a lack of infrastructure, limited government capacity, and limited and low quality health and education services contribute to endemic poverty and poor human development indicators throughout the province. While the focus of the programmes under the Special Autonomy status seek to promote poverty reduction strategies while supporting the rights of indigenous Papuans, the province remains one of the poorest in Indonesia. The province also remains one of Indonesia's most diverse and unequal provinces, know for its cultural, ethic and linguistic diversity.

The Millennium Development Goals (MDGs) are not likely to be met neither in Papua nor in West Papua, and are especially lacking in the remoter districts – which are also the districts with the highest percentages of indigenous Papuans. The significant economic growth enjoyed by Papua has not been translated into poverty alleviation. Again, particularly the isolated districts and regencies are the worst affected. The problem has been recognized and a People-centred Development Programme has been formulated to achieve the MDGs. This programme sets out to strengthen local government and civil society capacities to achieve the MDGs, working with multi-stakeholders and focussing on effective delivery of basic services in most affected areas. With this as foundation, Provincial government agencies and Papua-based development partners have prepared a plan for village development, know as RESPEK (Rencana Strategis Pembangunan Kampung) to focus on these issues.

4.2.1 Poverty alleviation

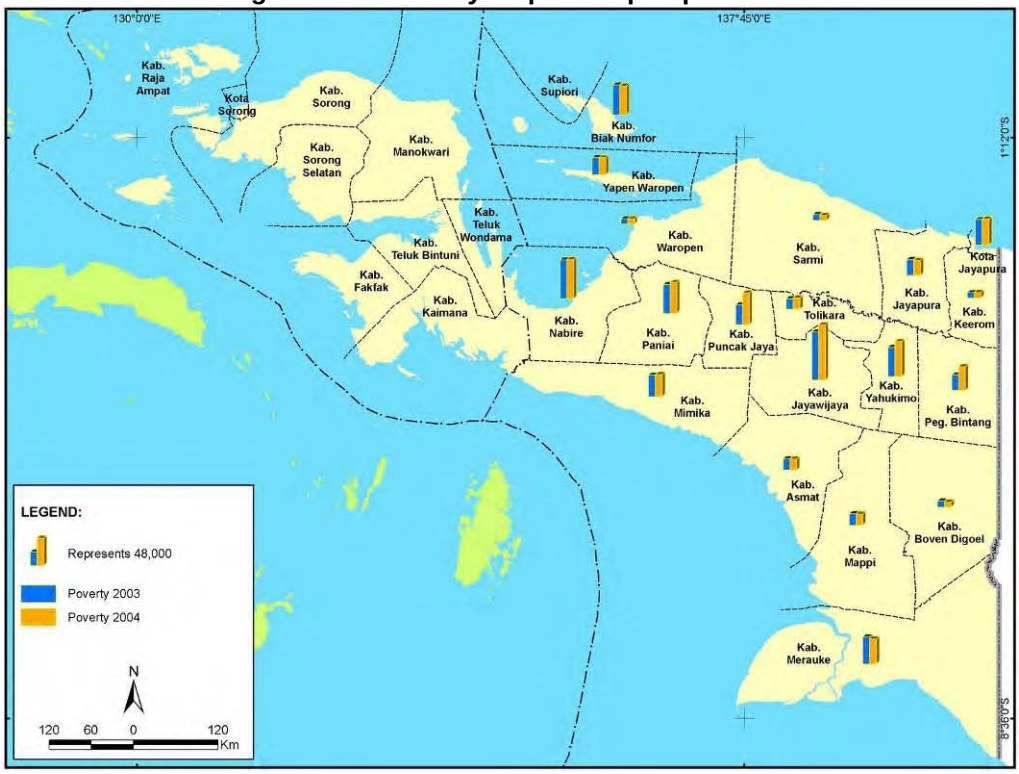
According to recent analysis conducted by UNDP, around 42% of Papuans are believed to live below the poverty line, more than double the national average. This is primarily attributed to the fact that these people live in remote, isolated areas and have limited, if any, access to health and education and markets. The majority of poor people live in the mountainous highland areas (Jayawijaya, Nabire, Paniai,

[3] World Bank. (Draft) Papua Public Expenditure Analysis.

Puncak Jaya, Yahukimo) and in areas that are further from the economic centers (Merauke and Manokwari) (Figure 4.15). Poverty is less severe at the economic centres (Jayapura, Sorong) and in areas that have abundant mineral, oil and gas resources (Fak Fak, Mimika and Kaimana) (World Bank 2007).

Overall, the Papuan government aims to alleviate poverty in Papua. They hope to do this by improving health and education facilities and by improving access to these facilities. They also hope to ensure food security and to build up infrastructure in the province to support development and to establish economic hubs in Biak, Timika and Yahukimo. The Governor of Papua province has also pledged to develop four isolated regions: 1) Wamena-Jayapura; 2) Yahukimo-Pantai Selatan; 3) Enarotali-Nabire; and 4) Puncak Jaya-Timika.

Figure 4.15: Poverty map for Papua province



Source: Papua in Figures 2006, Bappeda and BPS, 2006.

4.2.2 Health

According to UNDP, nine out of 10 villages do not have basic health services with a health centre, doctor or midwife. Papua has the highest mortality rate and the lowest life expectancy rate in Indonesia. It also has the highest infant and maternal mortality rate in Indonesia, almost four times than the national average. Health services are poor. The Papuan people suffer from famine and disease, such as malaria, cholera, typhoid, pneumonia, leprosy (UNDP 2005). Papua also has about 30% of Indonesia's HIV/AID's infections.

One of the key factors thought to be hindering good provision of health services to Papuans, especially in isolated areas, is access to these facilities. Poor access to these facilities is also thought to deter health professionals from working in these regions.

The Papuan government has therefore prioritized providing access to isolated regions. It is also planning to establish more health centres in isolated regions.

A Short history of health services in Papua

The New Order government put considerable effort into increasing medical services in Papua. The number of public clinics and hospitals grew significantly from the 1970s onwards. Many skilled doctors and medical auxiliaries were made available by Jakarta but they faced shortages of medicines and equipment. The montane interior and the southern plains lagged behind in this development largely because poor infrastructure and harsh working conditions deterred doctors and nurses. In some regions, diseases like malaria, yaws, leprosy, respiratory infections, tuberculosis, and venereal diseases spread where the Dutch had previously been able to curtail them through systematic and well-monitored campaigns.

In the early 1970s a national scheme called the Applied family Welfare Program (PKK: *Pembinaan Kesejahteraan Keluarga*) was implemented in Irian Jaya. The most successful part of the program appeared to be the establishment of a village health service post (posyandu) that is run by volunteers and the scheme for consultation by traveling nurses from the headquarters community health center (*Puskesmas*). However, in most rural regions these services are hampered by regular shortages of medicine, unavailability of trained personnel and poor planning and coordination (Tapp 2007).

4.2.3 Education

According to UNDP, one third of Papua's children do not go to school. Ethnicity and social-economic factors play a role in school attendance. Among tribal groups, children of the Asmat and Marind in the Merauke region have by far the lowest incidence of attending school (Asmat 67%, Marind 60%). The level of education among women is strikingly low, especially in highland regions such as Jayawijaya (Timmer 2007). Other factors influencing school attendance are: transportation and access to education centres; a lack of qualified teachers willing to work in isolated regions; a lack of education facilities, especially in isolated regions.

A brief history of education in Papua

In 1960, the total number of village schools was around 800, most of which were managed by missionary societies and congregations. In the rural areas, only the very simplest three year education seemed feasible and few Papuans rose above this level.

The Dutch attempted to improve education in Papua by establishing *vervolgscholen* (supplementary schools, most of which had boarding establishments) and by allowing some Papuans to study abroad.

In the course of the New Order period, the administration expanded education in Irian Jaya extensively. The number of state schools grew markedly from the 1960s until today. Since the beginning of REPELITA II (1974-1978) primary schools have been made available in every village and primary education is now compulsory. This lead to a major increase in attendance at primary education in most regions of Irian Jaya, but access to higher education remained limited as it was primarily only made available in provincial and district capitals. Only one university has been established in the province of Papua—Cenderawasih University.

Many policy makers in the Department of Education, including a number of governors, have regularly expressed the need for reviving subsidized boarding in rural regions of the province (Timmer 2007).

4.2.4 Food security

After the El Nino Southern Oscillation (ENSO) event of 1997-98 caused drought and famine, food security became an important issue for governmental and non governmental agencies. Papua experiences periods of uncharacteristically low rainfall during El Nino warm events of ENSO and these events can seriously disrupt food production.

For most poor people, arable agriculture provides the basis of their livelihood. Subsistence is based on the production of root crops, banana, green vegetables and other horticultural produce. Tree crops also provide food, notably sago (*Metroxylon sagu*), which is an important food for about 10% of rural villagers (Bourke 2001).

Sweet potato is one of the most important staple foods grown in the central highlands. It provides more calories to rural villagers than banana, sago, Colocasia taro, Xanthosoma taro, yam, cassava, and sugarcane combined (Gibson 2001). Other important food crops for the highland people are taro, cassava and potato.

Famine and drought in the central highlands

The central highlands of Papua have been subjected to drought and famine throughout history. Drought and famine usually occur when there is a major ENSO event and these events have been recorded for the years 1914-15, 1941-42, 1972, 1982, 1997-98 and 2005

The 1997-98 famine was estimated to result in the deaths of more than 1000 people. The majority of deaths did not directly result from starvation, but from drought-related disease (malaria, respiratory tract infections and diarrhea) exacerbated by malnutrition.

Communities hit hard by famine and drought were primarily found in the Ilaga valley and the Agadugume and Kwiyawagi areas of the West Baliem valley (districts of Puncak Jaya and Jayawijaya), the Langda area of the eastern Central Range (Jayawijaya district); and communities living in the district of Yahukimo.

Drought and famine have primarily arisen from frosts and bush fires. These climate-related impacts destroyed sweet potato plantations and other important crops. Relief efforts have been slow to respond and have often been thwarted by bad weather and limited access to the highland regions (Ballard, 2000).

4.2.5 Sanitation

According to a recent World Bank Infrastructure Report, 21% of Papua's population has access to adequate sanitation (World Bank 2007). The overall low access to adequate sanitation is due the high proportion of people living in hard to access rural areas (78%) and exceptionally low coverage of rural sanitation (17% cf 40% for rural Indonesia). In urban areas coverage of septic tanks is reported as 57% in Papua, with higher than average coverage in the Provincial capital of Jayapura (70%). The provincial government has not allocated any funds for improving sanitation.

For medium-small cities like Jayapura, Marauke, and others in Papua, the substantial expansion and upgrading of septic tanks and small scale decentralized sanitation systems is initially recommended to achieve the MDG target of 83% urban coverage. Improved quality of sanitation is needed as 'septic tanks' (which like all other cities in Indonesia are actually 'cubluks' or soakpits) are often the cause of pollution in drains, groundwater and surface water.

The construction of septic tanks is a household responsibility, but Government investments are required for a) assessment, planning and operations of sanitation services, b) community based sanitation facilities in dense areas, or a small networked systems, c) construction, O&M of sludge treatment facilities in each city d) ensuring a reliable tanker service to empty the septic tanks and e) promotion of improved sanitation, hygiene practices and hand-washing with soap.

Urban sanitation investment to reach the MDG urban target of 83% requires around IDR 118.3 billion (USD 13 million). This includes: situation assessment; development of a local sanitation strategy, capacity building and promotion of improved sanitation and hygiene, construction sludge/sewerage treatment facilities in three cities with associated tankers, management, O&M services. Small sewerage network or decentralized treatment works may be justified in Jayapura and Sorong, pending situation assessment. Situation assessment, strategy development, capacity building is estimated at IDR 2.7 billion (USD 300,000) per city. Community investment, sanitation and hygiene promotion costs are estimated at IDR 109,200 (USD12) per person without sanitation and IDR 36,400 (USD 4) per person with current facilities. Construction of sludge and/or sewerage treatment facilities is estimated at IDR 3.6 billion ($400,000) per city.

For rural sanitation training, capacity building, facilitation and promotion investments on a community basis are needed to improve hygiene practice and sanitation facilities. At an estimated cost of IDR 72,800 (USD 8) per person, IDR 91.0 billion (USD 10 million) would be needed to achieve the MDG goal of 69% coverage of the 2008 population figures.

4.2.6 Improved welfare and rights of indigenous Papuans

Indigenous Papuans have become marginalized in Papua over the last few decades and some ethnic groups have been threatened by transmigration and spontaneous migration associated with large-scale developments, such as the Freeport mine. In the Freeport area, for instance, indigenous Kamoro and Amungme people have gone from making up greater than 95% of the population in the Freeport Contract of Work area, to less than 15% today (Ballard, 2005).

Papua has special autonomy status and the provincial government seeks to improve the rights and livelihoods of indigenous people. Papua's special autonomy law includes provisions that recognize the validity of Papuan cultural institutions and practices. It also gives Papuans the right to develop their own symbols, including a flag and an anthem, as long as they were not considered symbols of sovereignty; and allowed Papuans to retain a much larger share of locally generated revenue than in the past, including 70% of the income from oil and gas, and 80% from mining. The law also mandated the establishment of a Papuan People's Council (*Majelis Rakyat Papua* or MRP) which is composed of ethnic Papuans. The MRP has been given authority to approve draft provincial legislation; review and make recommendations over agreements that the provincial government was planning on making with third parities with a view toward ensuring that the rights of ethnic Papuans would be protected; and to review and approve nominees proposed by the provincial parliament for governor, vice-governor, and members of the People's

Consultative Council in Jakarta. The MRP primarily strives to improve the welfare of indigenous Papuans.

4.3 Environmental priorities

The forest, freshwater and marine natural endowments of Papua province, and indeed the whole island of New Guinea, are of global biodiversity conservation value, and among the richest on earth. In addition, they are vital elements within the livelihood strategies of the people's of the province, and notably the indigenous population.

At the same time, there is intense competition by a range of stakeholders competing for control over the Province's rich natural resources, and in particular its mineral resources. Within this context, central government efforts to maintain control over the management of the Province's resources have been hotly contested, and regional autonomy and Papua's special autonomy law have encouraged both local governments and local people to assert control over natural resources and the extraction of these resources. The situation remains ambiguous particularly in situations where extraction of one resource (e.g. mineral extraction) is at the expense of sustainable management and/or protection of another resource (e.g. forests or areas of high biodiversity conservation value).

Management is also a key and remains a challenge in a context of poor or absent institutional and human resources management capacity. Thus the management of areas designated for protection needs vast improvement, while none of Papua's conservation areas have management plans in place, and boundaries remain disputed by indigenous people who maintain customary rights over most of Papua's land and coastal areas. Both district government, as well as mining companies with exploration rights consider protected areas to be an impediment to local development. It is certainly a challenge to ensure that environmental issues become linked with poverty alleviation – and that developments that do take place both take into consideration Papua's global responsibilities as well as their responsibilities to their own people, in their objective to help them move out of poverty. Within this equation, the issue of decision-making (national, provincial, local) and the question of sharing of revenues become key. Greater retention of revenues within the Province decreases Papua's need to increase exploitation of its natural resources and its environment.

4.3.1 Global warming and climate change

Global warming and climate change have become priorities of the international community in recent years. Limited evidence available on mean temperature change in the New Guinea region since the 1970s suggests an increase of around 0.2˚C per decade in lowland areas and 0.3˚C in the highlands. This is consistent with evidence from other tropical regions, and is reflected by changes in the altitudinal limits of some major food crops (Prentice & Hope 2007).

Many species of flora and fauna will probably not be able to survive climate change. Recent modelling suggests that 15-37% of a sample of 1103 terrestrial species of plants and animals would eventually succumb to climate changes by 2050 and are 'committed to extinction'. Some species will simply not find suitable habitat available

and others will be unable to reach places where the climate is suitable. Changes in habitats from global warming will be more severe at high latitudes and altitudes that are in lowland tropical areas. According to Flannery (2005) a further increase of 3˚C over the course of the next century would be sufficient to eliminate the alpine herbfield habitat which is currently restricted to elevations above 3900 metres, and that would mean the disappearance of the alpine woolly rat (*Mallonms gunung*) and the worlds largest egg-laying mammal, the long-beaked echidna (*Zaglossus bartoni)* (Prentice & Hope 2007).

The elevation of sea surface temperatures as a result of global warming threatens enormous damage to coral reef ecosystems. Although reefs in the New Guinea region show little evidence of bleaching to date, major bleaching events can be expected to occur on a regular basis within the next 50 years (Prentice & Hope 2007).

Global warming is also expected to be the indirect driver of rising sea levels that will have a significant impact on all coastal ecosystems. An increase of 500 mm over 50 years would outstrip the observed growth rate of some corals, which means that low lying coral based islands and atolls would be converted into saline swamps before they are submerged and their sediments are dispersed into the surrounding ocean. The areas covered by sea-grass beds, mangrove forests and coastal wetlands would all be reduced substantially by a 500 mm rise in sea levels. The effect would be especially pronounced in the Gulf of Papua, with a major incursion of seawater over the deltaic floodplains, but all the major river deltas of mainland New Guinea would also be affected to some degree (Prentice & Hope 2007).

Papua's glaciers—indicators of climate change

The Papuan glaciers found on the Jayawijaya mountain range are the only glaciers within Indonesia and provide critical information about climate change. Glaciers on Mt Jaya and elsewhere in Papua have been shrinking since they were first photographed in 1907 and 1936. Known collectively as the Carstensz Glaciers, the principal Mt Jaya ice masses of the 1990s consisted of two valley glaciers, the Meren and Carstensz glaciers in the Meren and Yellow valleys, respectively as well as two high elevation plateau glaciers, the West and East Northwall Firn. Other ice caps occurred at Mt Idenberg, 15 km west of Mt Jaya, on Mt Trikora, and on Mt Mandala.

Ice disappeared from Mt Trikora in the 1960s and from Mt Idenberg in 1978, leaving a small ice dome on Mt Mandala. The total area of the Carstenz glacier fell from 13km^2 in 1936 to 3.3 km^2 in 1991, and the remaining ice was then divided into three patches, one of which melted completely between 1997 and 1999. The West and East Meren Glaciers melted away completely between July 1997 and February 1999.

4.3.2 Deforestation

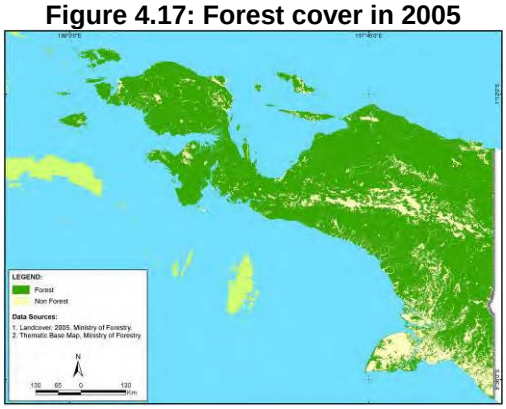
Deforestation and land-use change have attracted widespread concern in recent years because they are considered to be the second leading causes of global warming and climate change. They account for 19% of global carbon emissions, and over a third of emissions from developing countries. In Indonesia, deforestation and land-use changes are estimated to account for 83% of Indonesia's carbon emissions and 6% of global greenhouse gas emissions (PEACE, 2007). Carbon emissions

released from the logging, burning and conversion of Indonesia's forests and peatlands have helped make Indonesia the world's fourth largest greenhouse gas polluter after the USA, European Union and China.

Deforestation has been marginal in Papua (Figure 4.16 & 4.17), but is still an area of concern. Deforestation results from multiple causes, including logging, oil palm and industrial timber developments, mining, road developments and transmigration. These causes are often linked and can result in marked deforestation in key development areas, such as the Freeport mine site.

Figure 4.16: Forest cover in 1985

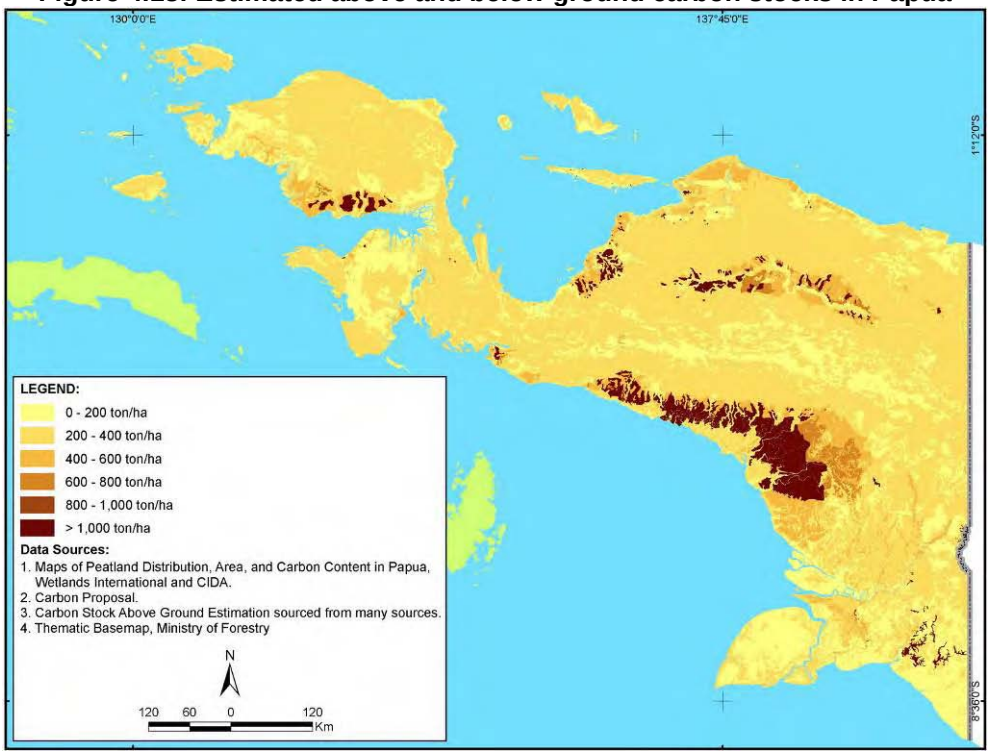
Figure 4.17: Forest cover in 2005



Curbing deforestation in Indonesia would be a highly cost-effective way of mitigating climate change. This is because avoided deforestation would prevent carbon being released into the atmosphere from the burning and logging of forests. Conserved forests also have the potential to absorb global emissions into their biomass, soils and products and to store them—in principle in perpetuity. Moreover, avoided deforestation efforts offer additional benefits, such as protecting biodiversity, preventing soil erosion and protecting the livelihoods of forest dependent populations.

Papua's forests have a large potential to become world renowned as biodiversity and carbon havens because the great majority of Papua's forests store over 400 tonnes of carbon per hectares. Some forest areas, particularly those located on peat soils, contain up to 1000 tonnes of carbon per hectare (Figure 4.18). 6.34 million hectares of Papua's forests have been designated for conversion—and these forests may be eligible for payments under a carbon credit scheme.

Figure 4.18: Estimated above and below ground carbon stocks in Papua

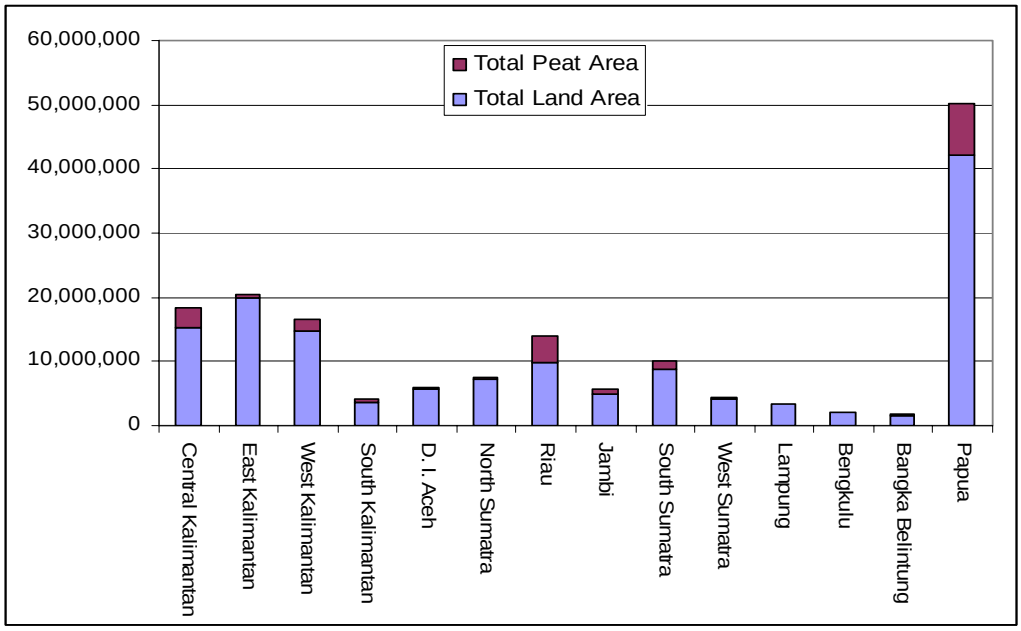


Nevertheless, significant economic incentives will be required to counter the proximate economic drivers of deforestation (e.g. oil palm expansion, logging, road developments, mining etc) to allow a performance based carbon payment scheme to be a credible option in Papua.

5.3.3 Peat conservation

The majority of Indonesia's peat lands can be found in just three provinces—Riau, Central Kalimantan and Papua (Figure 4.19). Approximately 6.9 million ha of Papua's land is peat soils. These peat lands contain large quantities of carbon (~ 60kg/m^3) (Hooijer et al. 2006) and many have argued that significant climate change benefits can be derived from peatland conservation. On the other hand, large quantities of carbon dioxide are released into the atmosphere if peatlands are logged or converted to oil palm plantations or industrial timber plantations. Emissions primarily result from peat oxidation and subsidence (Hooijer et al. 2006; Germer & Sauerborn 2007). Long-term studies of cultivated peat areas in Malaysia indicate that the decomposition of organic matter in peat soils is likely to exceed emissions derived from above ground biomass (Wörsten et al. 1997; Germer & Sauerborn 2007). This indicates that Papua's extensive peatlands should be prioritized for conservation.

Figure 4.19: Provinces containing large areas of peatlands within Indonesia



4.3.4 Watershed management, particularly in Merauke district.

The Papuan provincial government and a number of districts have prioritized watershed management to ensure a sustainable water supply for growing cities, such as Merauke district. The rapidly developing town of Merauke suffers major water shortages in the dry season and relies for its water on one of the few permanent swamps in the region (Rawa Biru swamp located in Wasur National Park). This catchment is critically important from a biodiversity perspective because it provides habitat for tens of thousands of water birds, fish and other animals. Of special note are the 36 species of rainbow fish that inhabit Papua's freshwater rivers. The area is also important for migratory birds from Australia. A multi-stakeholder water catchment forum (known as the BIKUMA catchment forum) has been established in this area to promote freshwater conservation and develop an integrated catchment management strategy.

4.3.5 Marine conservation

Papua's seas are located in the heart of the Coral Triangle—a global center of marine biodiversity and one of the world's top priorities for marine conservation (Figure 4.20). The Coral Triangle includes various important nesting sites for migratory sea turtles, the channels between major landmasses serve as passages for migrating mammals and mantas, an the waters support feeding grounds for large tuna populations that are targeted by international fishing fleets. The Coral Triangle is the focal marine area of conservation organizations, such as CI, TNC and WWF.

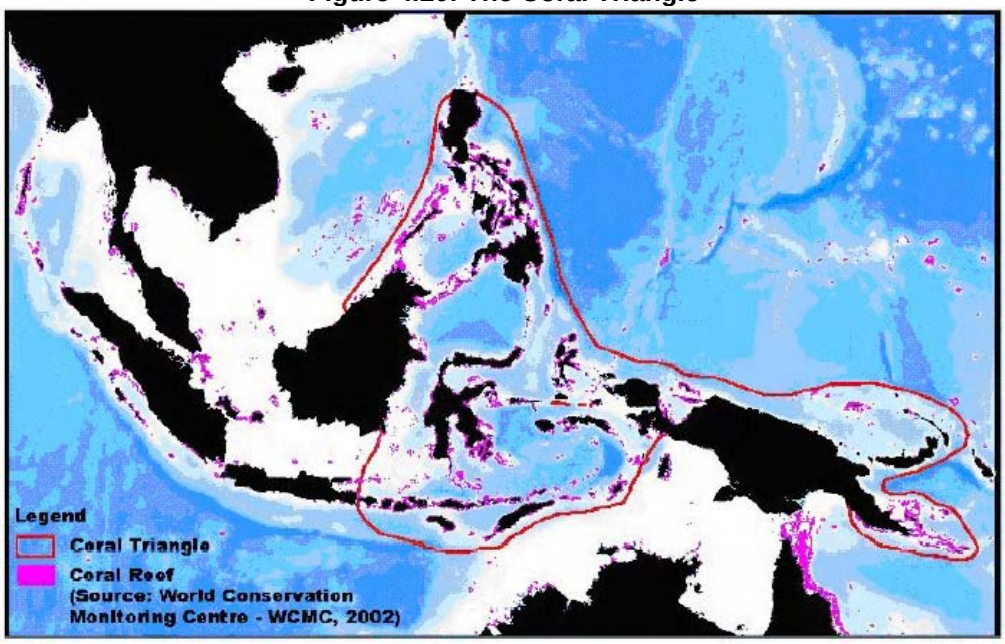
Marine conservation is more important for West Papua than Papua province because the marine reef environments found in Cenderawsih Bay and the Raja Ampat Islands are among the very richest on earth in terms of species diversity. Extraordinary numbers of hard corals, mollusks and reef fishes can be found in this area. These environments are also very productive, and form an important

sustainable resource for local communities. The region also supports a significant pelagic fishery, with key migratory species.

Papua's marine and coastal resources are threatened by extractive activities such as logging, the illegal wildlife trade and illegal fishing practices such as shark finning and bomb and cyanide harvesting. Marine scientists have also argued that Papua's marine resources can not withstand significant extraction and are threatened by plans to expand fisheries in the area (Mous et al. 2005).

The newly established Ministry of Marine Affairs and Fisheries plans to expand Papua's marine protected areas and to improve management of existing marine conservation areas.

Figure 4.20: The Coral Triangle



Note: The Coral Triangle spans Eastern Indonesia, parts of Malaysia, the Philippines, Papua New Guinea, Timor Leste and the Solomon Islands.

4.3.6 Terrestrial conservation management

Papua's forests are extremely biodiverse and contain nearly 50% of the biodiversity that makes Indonesia the world's most biodiverse countries in the world. These forests are home to more than 600 species of birds, including more than 25 species of birds of paradise, three species of cassowaries, and some two dozen each of parrots, pigeons, raptors and kingfishers. There are over 180 species of mammals, including fruit bats, insectivorous bats, tree kangaroos, possums and rats; 150 species of frogs; over 61 snakes; and 141 lizards. More than 100,000 species of insects. Most prominent are the huge and beautiful bird-wing butterflies, the giant phasmid stick insects, several lineages of giant beetle (longicorn, dynastine) and the world's largest moth.

Around 20% of Papua's total land area is designated as Conservation and protection forests and a number of prominent and well known national parks have been established in the province—Lorentz World Heritage Site, and Wasur National Park.

In addition, large sections of the Mamberamo have also been designated as Nature Reserve. Nevertheless, none of these areas have management plans in place and the boundaries of many are disputed by indigenous people who maintain *adat* (customary) rights over the great majority of Papua's land and coastal areas. Some district governments, particularly those with large areas designated for protection or conservation within their jurisdiction, also consider these protected areas to be an impediment to local development. The Ministry of Forestry, which is ultimately responsible for terrestrial conservation area management, plans to improve terrestrial management of conservation areas over the next 5 years, particularly in Lorentz World Heritage Site and Wasur National Park.

5. DEVELOPMENT OPTIONS

It was beyond the scope of this assessment to analyse all of the social, environmental and economic priorities highlighted in the previous chapter in detail, so four scenario's were prioritised: 1) transport and access; 2) mining; 3) forestry; and 4) the Mamberamo region. These four scenarios were chosen because:

- They could be spatially analysed and had a bearing on spatial planning;
- They were economic priorities of the government (i.e. the sectors generated revenue or the government were prioritizing these sectors for development and were allocating revenue for their development (i.e. the roads sector) and were therefore likely to have an impact on spatial planning.

5.1 Transport and access options

Alleviating poverty, improving health and education and ensuring food security are top priorities for the government of Papua. These top priorities are particularly important for the highland region of Papua which is primarily inhabited by indigenous Papuans and is one of the most populated regions of Papua.

One of the key factors believed to be impeding provision of health, education and other services that can alleviate poverty in the highlands and other areas is lack of access and the provincial government has consequently prioritized building and maintaining roads to rectify this situation.

Road building can provide some benefits, however, it can also result in a range of negative social, economic and environmental impacts and these impacts are assessed under the business as usual option below.

5.1.1 Business as usual option

Both the provincial and national government have allocated substantial funds (approx $US 59 million) for the development of a road network that will provide access to the populated highland regions. To date, a road has already been developed to link Jayapura up with Wamena (and Mulia), and a road has also been developed on the other side of the province to link up Nabire with Enarotali (Baliem Valley). However, both roads lack maintenance, are in serious disrepair and, to all intents and purposes, impassable. The next road plan is to develop a road from Enarotali to Timika and from Timika to Mulia and from Wamena to Mulia. These three road developments will provide a road network that will link up Jayapura to Nabire via the highlands. A major road network is also planned for the Mamberamo region and a Southern Highway has been proposed to link Timika up with Tanah Merah. This highway would cross both the Lorentz National Park as well as cut straight through the deep peat soils located in the districts of Asmat and Mappi.

5.1.2 Prioritize certain road developments

Any further road developments should seek to take into account the population served and consider geographical conditions that may render road developments costly and difficult. Future road developments will also have to consider other transport options and be put into that context – for example, linking road development to improved ports and harbours (water transport) or to increased airport

capacity (for example in the highlands), rather than necessarily attempting to build long stretches of road through areas with low population densities and limited potential for a substantial volume of traffic.

The only major road development that could potentially be envisaged in the foreseeable future is a coastal road that will link Nabire-Waren-Bagusa-Sarmi. This road would have limited affect on forests and serve around 480,000 people as it would link up two major cities—Nabire and Jayapura. The road would not traverse difficult terrain; additional civil works would include a major bridge will need to be constructed to cross the Mamberamo river. However, there are no major population concentrations between Nabire and Sarmi which raises the question whether this road will be able to generate sufficient traffic volumes between the towns to justify road construction. This will need to be compared with improved air, and especially water transport.

Construction of the Tanah Merah to Jayapura road through a sparsely populated area with major topographical challenges does not seem wise. Initial attempts to construct this road have basically failed and the maintenance costs will be extremely high for a road likely to carry very little traffic. Following the conclusions of the World Bank Infrastructure Study[4], this option cannot be recommended.

The road linking up Enarotali to Timika also does not seem wise, despite the fact that this road would link up two major and populated towns. This is because the road would need to traverse mountainous terrain and would therefore be costly and difficult to build. This would also be the case for the planned road linking up Timika to Mulia and the road linking up Mulia to Wamena.

The road plan linking the coastal town of Waren to Debra and Sentali should be discarded for now as it would serve a very small population, cross difficult terrain and open up the Mamberamo region to deforestation.

5.1.3 Ensure existing roads are well maintained

An ADB (2002) study on roads stressed that long term social and economic benefits from roads are often threatened by a neglect of road maintenance. It is worth noting that inadequate road maintenance leading to repeated resurfacing and rebuilding is substantially more expensive than maintaining assets and the economic cost of time lost, wear and tear on cars and road accidents caused by poorly maintained roads is immense.

The government of Papua has designated around IDR 462 billion for annual road maintenance (about USD 50 million) (World Bank 2007). This funding should primarily be used to keep well-travelled roads that serve large populations in good condition. This would include:

- The Nabire to Enarotali road
- The Jayapura to Armopa road

Various methods are used to select road sections for inclusion in rehabilitation projects and the appropriate level of treatment they require. In most countries

[4] World Bank—A Brief Review of the Infrastructure Expenditure Priorities for Papua and West Papua in 2008.

management systems are in place which can be used for all phases of the road management process, from central and regional planning, budgeting, project design, contract document preparation, and finally regular monitoring of the national and provincial networks (Paterson 1990).

Usually roads are not selected unless they exceed an economic internal rate of return (EIRR) of 12-15 percent. The higher the EIRR, the more economically efficient is the project. Once the selection is made, computer models in the management systems such as RAMS or the IRMS are used to analyse the economic viability of various improvement options for each section of road, based on the construction costs for each option, traffic counts and traffic forecasts, and vehicle operating costs. The economic analysis then determines the optimum rehabilitation and maintenance strategy for each road section.

There is a down-side to this approach. Emphasizing the EIRR often leads to the selection of projects serving better off groups over projects which would serve poorer groups. Moreover, Hughes (2005) has argued that projects involving rehabilitation of major roads are unlikely to produce any measurable reduction in poverty in most of the areas through which the roads pass. This is because the individual schemes in themselves, while important, are in most cases relatively short sections of road within much longer road links. In most cases it is unlikely that the proposed road improvement works which is undertake on the individual sectors of road will dramatically improve local transportation and the benefits to individual long distance transporters of freight and passengers will be minor to insignificant. This is especially the case for periodic maintenance, which in most cases is being undertaken to prevent further road deterioration rather than to rehabilitate roads in poor condition.

Finally, a road development program which only focuses on major roads and does not include feeder roads is likely to have more negative than positive impacts, especially on poverty alleviation. While major trunk roads may improve transportation between urban centres, they will have little positive impact on poor people living in remote areas unless a much boarder transport and access program can be developed which takes as departure the needs of the rural population living in remote areas – rather than the transport needs of urban people. Such an approach would not just focus on roads, but rather on roads in combination with air and water transport, as well as, potentially, also improving non-motorised forms of transport (head-loading, carts, bicycles, canoes, etc.).

Box: The benefits to rural communities from road rehabilitation

The major benefits reported to accrue rural populations from road upgrading and maintenance projects are as follows:

- A more frequent and reliable service with more comfortable and faster travel, leading to greater mobility. Operating costs for vehicles transporting both goods and people become cheaper.
- Increases in transport volume and decreases in fares generally occur most markedly where road improvement is accompanies by increased competition among transport providers.
- The improvements in transportation facilitate access by rural people to markets and suppliers in larger villagers and towns.
- The delivery to rural people of health, education and agricultural extension services available in major towns can be improved in the region if the road is upgraded to a former standard. Improvements in access to health services for women and children in particular are especially important for poverty reduction.
- There is generally some long-term increase in cash incomes, mainly because of improved access to markets and suppliers. There may also be a temporary inflow of cash from employment on the road improvement project itself. Increased case availability allows families to pay for school fees, health services and a whole range of consumer goods, both food and material items (Hughes 2005).

5.1.4 Improve air transport for passengers and cargo

As in any planning process, airport infrastructure should be designed and funded based on actual and expected demand. Taking into account the 100,000 population of Kabupaten Paniai for example, it is difficult to justify how the 3000m runway capable of landing large passenger jets requested in the LG infrastructure plan would ever be appropriate.

The best option for providing access to isolated highland regions such as Mulia, Wamena, Timika and Dekai appears to be improved air transport. Improved and new airports will help increase trade in export crops from the area – e.g. cocoa, coffee (and possibly sweet potatoes) and help with the provision of health and education services.

This option is not, however, ideal as clouds are likely to pose a problem for air-transport—Papua is one of the cloudiest places on earth. Moreover, it is important to note that during the drought of 1997-98, famine relief brought in by airplanes was impeded by poor weather, smoke and haze (Ballard, 2000).

A comprehensive assessment of airport options is required, however, the following information, provided through in-depth interviews with the Missionary Aviation Fellowship (MAF),5 should be taken into consideration.

In Wamena, focus should be on constructing a new and bigger airport which will allow for instrument landing and larger planes. The present airport is not suitable for expansion as the runway layout does not allow for a safe approach through the

[5] MAF operates from 6 Bases: Merauke, Nabire, Sentani, Wamena, Manokwari, and Timika

mountains. Finding an ideal location for an airport is a challenge in Wamena. This is because Wamena is located in the Grand Baliem Valley and is surrounded by mountain ranges on each side.

Building any commercial airport in the mountains has challenges as airplanes and terrain do not mix well. Yet, today with current GPS technology, many of these factors can be minimized if proper planning and locations are considered carefully. The current airport as it stands has done well to meet the needs of the Baliem valley for the past 50 years by using primarily small aircraft and limited as a Visual Flight Rules (VFR) and day only airport due to it's proximity to terrain. In order to move towards operations capabilities of larger aircraft as well as for operations during poor weather (instrument conditions) as well as night operations a location must be considered that allows safe approach, missed approach, landing, and takeoff considerations.

Due to Wamena's 5084 feet elevation, often mid day density altitudes soars up to 8500 feet which reduces aircraft performance at these altitudes thus requiring longer runways and larger climb-out margins. In looking at current day flight operations through-out Indonesia, it would seem prudent to build a runway that would be able to handle a Boeing 737 size aircraft. This would require a runway length of approximately 3 kilometres, with instrument approach capabilities, and lights. A location a little away from Wamena as a city and located in the valley to assure terrain separation during all operations may be essential and current infrastructure use maybe reduced to be only used by small mission aircraft in this case.

Separation of cargo and passengers would be prudent in development of this location. Wamena airport is already very busy and all flight operations must stay within the confines of the valley for arrival and departure and everyone uses certain mountain pass locations as well. The risk of mid-air mishaps is also a growing risk. With the precision of GPS more people are flying the same routes yet while climbing and descending are intersecting altitudes that other aircraft may be operating. With growth in operations and aircraft, better traffic control resources will also be needed such that duplicates a radar type environment. Radar may not be the best choice of traffic control as it is limited by line of sight unless the radar location is set up in on the mountain top versus in the valley.

Mulia currently has a one way airstrip, 810 meters long, at 5350 feet altitude, and 10% slope. Pilots are committed to land as they cannot out climb the rising terrain once they are within ¾ of a mile from the airstrip. Only minor lengthening and or widening of the runway along with surface care can be added to this location to improve margin and safety. None of this would add significantly to any service capabilities. Improving Wamena's airstrip to increase volume and lower prices as well as developing a reliable two lane road (minimum) connection between Wamena and Mulia would be the key in developing Mulia. Currently, there is a road going that is passable only by four-wheel drive vehicles. Again, making a low maintenance road easily used by the public and commercial trucking would be a prudent way in supporting Mulia.

Dekai. Dekai is the main airstrip and capital of Kab. Yahukimo. There is quite a bit of flight demand between Dekai and Wamena. Dekai does have river/boat access

from the coast were cement, fuel and supplies are brought in. There is a growing demand for flights out of Dekai to local villages as supplies are brought in that direction. This includes bringing cargo into Wamena as well. Passengers also seem to need to be transported between these locations. Infrastructure in this region would only make sense if it was tied either by road or river (or combination) out to the coast and eventually to Merauke. This location in the future could be another connecting point for the highland region.

5.1.5 Improve sea and river transport

Consideration should also be given to improving existing ports and establishing new ports. This may be the only option for isolated coastal towns, such as Agats, Wanapiri and Pirimapun, particularly since the latter two towns border large peat areas as well as mangroves and swamps—all of which are difficult to traverse via roads. Linking these areas to the highlands or the northern part of Papua is, nevertheless, difficult. The best option is to link the city of Agat (located in the Asmat district) with the city of Wamena via the Baliem river. River transport could also be improved to link up Agats with the town of Suhohai. Improved river transport could also be improved to link up Merauke with Tanah Merah.

River transport can potentially be used to provide health and education service to remote areas and this is already occurring in some regions. For instance, in Biak Numfor, the district government ha provided floating Puskesmas. Docotrs and nurses travel by boat to reach areas that can only be accessed by sea such as Padaido, Numfor Barata and Biat Barat (World Bank 2007).

Investment should be based on current actual and expected future demand. It should also be reviewed as to whether the existing ports are being used to their full capacity, data such as the current dwell time in port, time to unload, time waiting for entry to the port, cost etc, should be the basis of any investment decisions.

The ADB has funded two feasibility studies of the expansion of the ports of Jayapura and Manokwari and it was determined that this would improve their operations substantially. Jayapura port should be expanded so that it is able to be an international port. This is because the only international port in the region is located in Sorong, which is now located in West Papua. According to the ADB, the total investment costs of the Jayapura expansion were estimated at US$ 20.37 million with an Economic Rate of Return of 21%, for Manokwari the proposed investment cost was US$ 9.64 million with an Economic Rate of Return of 23%. Both of these ports are well above the minimum EIRR values of 10-12% that are usually regarded as minimum acceptable rates by the ADB.

The potential gains to be made from increasing the efficiency of existing seaports and airports will provide far greater productivity per rupiah than pushing the proposed construction of new facilities and massive upgrading of existing ones. Existing port facilities could focus on lengthening operating hours and increasing loading capacity, while airports could focus on safety improvements and increasing O & M spending (especially on grading on highland airstrips (World Bank 2007).

A canal option has been proposed as an alternative to the Southern Highway road option. This scheme was originally conceived by the Dutch colonial administration.

Efforts are underway to try to retrieve these plans which should be held in an archive somewhere in the Netherlands. It is unclear whether this option is supposed to follow the same route as the Southern Highway, but this seems most likely.

Construction of a canal is likely to cost more than building a road between Timika and Tanah Merah, will also involve a complicated system of water management and is unlikely to cater for a lot of transport of either goods or people (given than sea transport can also be used). The main environmental advantage would be that the peat soils found in the districts of Asmat and Mappi might be more protected under this scenario.

5.1.6 Access to education and health services

The issue of quality and quantity in education, and improvements in the health referral system have been included under transport and access because many of the key problems in these sectors are, in fact, related to access.

The objectives of the Provincial Education and Health authorities, together with those Missionary societies who are also providing educational and health services, is to improve both the **quality** and **quantity of services**, i.e. provide good educational services to the greatest number of school-age children, and good health services to the largest number of people. Scenarios will need to be based on the fact that it is very difficult to retain trained staff in remote areas (because of problems of transport and access) and that innovative approaches will need to be developed which take this into consideration – such as the provision of educational and health services in hubs. The following approach is already being considered.

- Limit education in rural areas to three years of basic education (1st to 3rd Grade) with a focus on basic literacy and numeracy. This requires fewer teachers and teachers do not require the same levels of skill.
- From 4th to 9th Grade, boarding facilities will be constructed at growth centres (along the coast and accessible by air and water transport).
- Health – provide basic facilities at the village level
- Referral system possibly linked to a mobile hospital system

<u>The advantages of this approach are:</u>

- Teachers and other government staff would be encouraged to stay in the service because they would be close to other individuals with similar backgrounds, they would have access to all services, housing would be provided, etc.
- This would tackle the human resources capacity gap at all levels of Papuan society.

<u>The disadvantages are:</u>

- Children will be away from home for the best part of a year, only returning home once. Will this alienate them from their culture and will it have an effect on the parent to child (age-group to age group) learning process in the *adat* areas. Will this situation result in a gender discrimination where only boys are sent to school? It will be a challenge to maintain cultural heritage if children educated away from home area.
- Experience that young people come to urban centres for schooling and stay on when they have finished, hoping to find work.

The approach of only focussing on quality and not on quantity carries with it the danger of elite focus. The model created used by the Dutch for developing a cadre of well-trained indigenous Papuans was through a system of boarding schools educating children seen as having potential. This would not tackle the problems of lack of capacity and will discriminate against the majority. The advantages are that the approach is more low cost and low maintenance.

However, this approach will not address the capacity gap; neither will it address the differences between the coastal areas (where many trans-migrants live) and the highland areas (where the majority is indigenous Papuan) are widened.

The least acceptable option would be to limit investment and focus on non-formal education and traditional health services. In other words, give up the idea that it is possible to educate so many children in remote areas and, instead, focus on literacy and numeracy skills. And, in the health sector, focus on support to traditional medicine and give up the idea that health services can be provided to remote areas.

Whichever approach is considered, people living in remote villages should be encouraged to build airstrips and install a system of SSB radios; so that air access is possible in emergency situations.

5.1.7 Summary and recommendations

The point of departure for improved transport and access is that planning needs to be done in a holistic fashion, rather than in a purely sectoral fashion. Where do people live and what are their transport and access needs?; and then, how can they be provided in the most cost effective manner? Moreover, it is not enough to obtain funds for **investment** in infrastructure, if there are not sufficient funds available to **maintain** this infrastructure later. This means that there also need to be a focus on the idea of providing a better **quality** of service.

It is recommended to develop a transport and access scenario which will focus particularly on opening up the highland areas through improved air, road and water transport, and link this up with a series of hubs and (rural) growth centres which provide services such as education and health, as well as providing points of access for marketing of goods, and movement of passengers. The focus on the highland areas is important as this links up with the provincial priorities on cultural heritage and support to indigenous capacity building, as well as on poverty alleviation, which is most severe in the highland areas.

5.2 Mining options

5.2.1 Business as usual option

Under a business as usual option, large-scale mining is likely to continue. Large-scale mining has generated significant revenue for all levels of government, but this revenue has not been well distributed. Large-scale mining has also contributed to the large-scale loss of biodiversity habitat in Papua. Apart from loss and degradation around a mine, the associated development of roads, towns and ports, the resulting pollutants carried in water course, and the increased competition for land and

resources from the influx of outsiders, have also damaged Papua's environment. This is likely to continue to be the case unless stringent environmental monitoring occurs, mines are regulated and forced to comply with environmental regulations and revenue can be more equitably distributed to alleviate poverty.

5.2.2 Utilize mining revenues to promote equitable development that does not result in extensive deforestation

Mining dominates Papua's economy and some Papuans have argued that Papua province should be able to generate sufficient revenue from mining and gas extractive industry projects and does not therefore need to log its forests. This would be true if funds generated from these operations were efficiently channeled into infrastructure and development projects, particularly health and education services.

This has happened in other countries and has been analyzed in detail by Wunder (2003). In his book entitled: Oil Wealth and the Fate of the Forests, Wunder demonstrates that domestic policy responses to oil and mineral wealth can pull labor out of land use and forest degrading activities. This has been most notable in Gabon where the country's oil wealth allowed most people to move out of agriculture and to import the food they eat. As a result there has been very little net forest loss, although logging and hunting for wild meat have caused certain problems. Air transport rather than roads have been prioritized as the preferred means of passenger transport and minimal deforestation has occurred as a result. It is therefore possible that Papua's mineral resources can reduce pressure for logging and forest conversion. However, great care is needed to ensure that mining revenues are shared more equitably to alleviate poverty, especially in rural areas.

It is worth noting that many of the world's richest countries have benefited greatly from mineral extraction. Australia, Canada, Finland, Sweden and the United States for example, have all had extensive minerals industries and used them as a platform and used them for development. A number of developing countries can also point to minerals-led development. Chile, whose copper production accounts for 35% of world output, is now among the group of 'high human development' countries (ranked 39th by UNDP). Here too many of the rewards have been reaped locally: the mining capital of Antofagasta is relatively prosperous and over the last 20 years unemployment has fallen despite the arrival of immigrants from other regions. Africa can also provide positive examples: one of the most successful mining countries has been Botswana, a major producer of gem diamonds that has also had one of the world's highest economic growth rates—averaging 9% annually in 1996-99. The reverse side of the coin is that Botswana also has one of the highest HIV/AIDS infection rates in the world – 24%. Fortunately, Botswana's mineral wealth does contribute funds to allow for 85% of those infected to be treated with 'scientific' Western-medicine-approved ARV treatment regimes for HIV/AIDS. This should also be a wake-up call for Papua which already has the highest HIV/AIDS infection rate in Indonesia.

How should a country expect to gain from the minerals sector? One of the most immediate ways should be through additional employment—both direct and indirect. Mining activity should also generate new infrastructure such as roads, railway lines, electricity supplies, schools, and hospitals that, although provided for the minerals

industry and its work force, can also benefit the rest of the population. At the local level, it should contribute to the development of skills and local businesses. Meanwhile the economy as a whole can be stimulated as minerals companies forge multiple outward linkages—backwards to industries that supply goods and services, or forwards to industries that process mineral outputs. World Bank studies of mining activities around the world suggest that every dollar that a company spends on a mine generates another US$2.80 elsewhere in the economy. Finally, there are more general economic benefits, including injections of hard currency that strengthen the balance of payments, along with royalty payments and corporate taxes that boost government revenues.

Any country or autonomous region that wishes to translate mineral wealth in the ground into human development for its people faces stiff challenges. These include:

- Demonstrating minerals potential and attracting exploration and development investment
- Establishing an attractive investment climate and progressive minerals policy
- Developing a domestic mineral sector infrastructure
- Creating and sustaining mineral wealth while protecting environmental quality and other social and cultural values
- Sharing the surpluses or economic rents from mineral production equitably among different levels of government, local communities and mining companies
- Converting non-renewable resources (mineral wealth) into renewable ones by investing in physical and human capital, and doing so in a way that also helps protect the interests of future generations
- Maintaining a stable economic environment while coping with the exchange rate impact of mineral explores, fluctuating international commodity prices, and the demands for structural adjustment and
- Dealing with the potential impact of the mining sector on crucial issues of governance, in particular corruption, regional tensions over how revenue is shared, human rights and conflict.

There is, nevertheless, a down side to focusing on mineral wealth to generate development. In several countries, such as the Netherlands, a booming mineral economy has been known to squeeze out other industries and export sectors, notably manufacturing and agriculture. This phenomenon is known as the ‘Dutch Disease’ and it was held responsible for the demise of the manufacturing and agriculture sector in the Netherlands during the 1960s and 1970s.

Moreover, the extent to which mining operations benefit local communities has changed over time. Mining employment is in general falling in most of the world, even as output goes up. It is also becoming more specialized. There are today far fewer semi-skilled ‘pick and shovel’ jobs than there once were, and it is often difficult for local people to fill most of the skilled positions. In addition, it appears that a corporate strategy based on ‘contracting out’ or outsourcing combined with better transportation and smaller work force means that even food and other such commodities may be increasingly supplied by foreign or at least non-local vendors. The government of Papua will need to offset these trends to ensure local people gain more of the benefits from mining operations if it chooses to focus economic activity around mining and de-prioritize other sectors, such as agriculture and forestry.

5.2.3 Utilize mining revenues to build roads

An alternative to the above scenario is utilizing revenue generated from Papua's mining sector to build roads. This scenario is more likely to lead to deforestation. This scenario was also identified by Wunder (2003) who determined that some countries have used large influxes of money from petroleum or minerals to promote activities that cause deforestation like building roads into forested areas or re-settling people there and providing cheap agricultural credit. This situation was found in the Latin American countries that Wunder studied (Venezuela, Mexico and Ecuador). In all of these countries, roads were established to facilitate agricultural expansion. This scenario is likely to occur in Papua if the provincial government goes ahead with its current road plans.

5.2.4 Reallocate protection and conservation forest areas allocated for mining exploration for carbon storage or logging

Around 6.3 million hectares of forest land have been allocated to mining companies in the province of Papua alone. Another 13.4 million hectares of forest land has been allocated for exploration. The majority of this land (62%) falls within protected and conservation forest.

Indonesia's Basic Forest Law (UU 41/99) currently bans open-pit mining in protected forests. This decision was, nevertheless, contested by the mining industry as they have claimed that the Forest Law created an unfriendly climate for international mining companies.

In March of 2004, President Megawati Sukarnoputri responded to the mining lobby by issuing a Government Decree "in lieu of law" (Perpu 1/2004), thereby invoking a state of emergency under Article 22 of the Constitution. The Decree stipulates that all licenses and contracts for mining in forests made before the enactment of the 1999 Forestry Act are now valid for the remainder of the original term of the license or contract, however, only 13 companies were named as benefiting from the Decree because they had "proven reserves and are economically viable." This decision was strengthened by a decree (41/2004) enacted by the House of Representatives in May 2004.

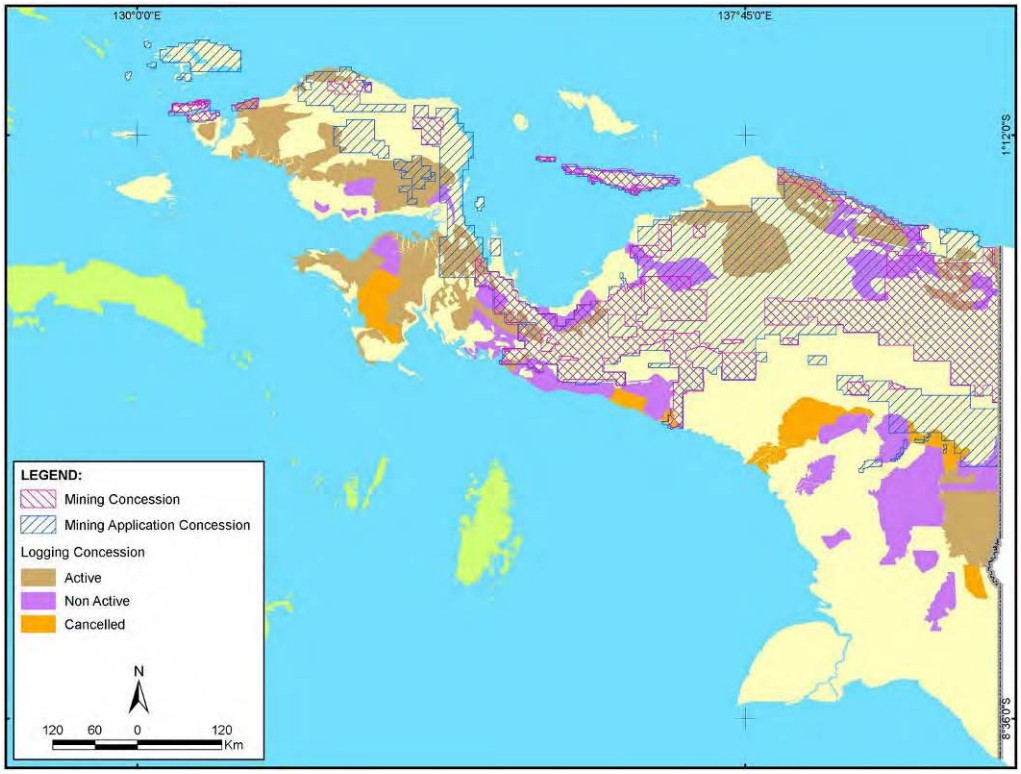
Law No 41/2004 was challenged by civil society groups but the constitutional court rejected the challenge and upheld the previous law that enabled 13 mining companies to operate in protected forests. The court consequently ruled that the government should honour commitments made to companies awarded exploration licenses prior to 1999.

Of the 13 companies allowed to continue with their activities, 2 are based in Papua: PT Freeport, and PT Gag Nikel. The fate of other companies with concessions covering several million ha of protected and conservation forest areas remain unclear.

If any of these mines prove to be economically viable, it is possible that they might be able to lobby for permission to continue with their mining operations. Alternatively, the 12.3 million ha allocated for mining that overlaps with conservation and protection forest can potentially be reallocated for carbon storage or alternative land uses (most likely logging). The latter is likely to occur under a business as usual

scenario because the great majority of the licenses allocated for exploratory mining overlap with active and non-active logging companies allocated concessions in the northern part of Papua Province (see Figure 5.2).

Figure 5.2: overlay of mining and logging concessions



5.2.5 Increase revenue from mining by increasing the tax for utilizing forest lands

In February 2008, a controversial presidential decree was issued to generate revenue. The decree requires open-pit miners to pay between Rp1.8 million and 2.4 million ($200-265) per hectare (2.5 acres) for forest land used for activities such as housing, roads, mine sites and waste dumps. Prior to this, no tax was charged for the utilization of forest land for mining so the law at least recognizes that mining companies should pay for the utilization of these lands, however the amount that miners are required to pay is not considered to represent the real value of forests, particularly if they are eligible for carbon credits. It would therefore be worth considering revising this law and increasing the tax in order to generate revenue and represent the real value of forests.

A mechanism also needs to be established to channel funds generated through this new tax to the provincial government as it currently appears that funds will primarily go to the central government.

5.2.6 Summary and recommendations

The days have passed since the mining sector in Papua could feel safe from the pressure of Corporate Social Responsibility. Environmental and consumer groups, civil society and non-Governmental organisations, the media and international public opinion are stronger influences now than at any time before.

These means that both existing and potential mining operations, especially those which threaten conservation or protection areas, or which are seen as having a negative effect on climate change, will find their every move the subject of scrutiny and censure.

Therefore it is recommended that any new mining venture takes as its point of departure the potential benefits for the population and the environment of Papua. And secondly, that efforts are made to arrive at a more equitable sharing of the taxes, royalties and profits from mining ventures so that the situation where Papua's very high economic growth figures are not translated into sustainable poverty alleviation is significantly changed for the better.

5.3 Forestry options

Papua's forest sector deserves special attention because:

- 97% of Papua's total land area is classified as forest estate
- Papua's forests remain largely intact and have only just started to become threatened by a range of factors: logging, oil palm, industrial timber plantations, mining etc
- Papua's forests contain biodiversity of global significance
- Papua's forests store large quantities of carbon
- Papua's forests can generate income for districts and local communities.

5.3.1 Business as usual option

The great majority of forests (14.7 million hectares) located in Papua province has already been allocated to large-scale corporations for logging, oil palm development, industrial timber development and mining. These corporations have primarily been granted licenses to exploit Papua's forest and mineral resources from the central government. While some of the revenue generated from these corporations goes to provincial and district governments, a large proportion still continues to go to the central government despite the fact that Papua's Special Autonomy law states that Papua province is entitled to 80% of revenue generated from forestry, fisheries and mining and 70% of the revenue generated from oil mining and gas mining (Article 34.b). Many of these of these licenses were awarded during the Suharto era and resource extraction has primarily benefited the corporations themselves as well as a select, well-connected elite within central and provincial governments. This situation has not facilitated sustainable logging practices because outside companies have little incentive to practice sustainable logging as they have merely been interested in extracting timber for high returns.

Despite the shortcomings of large-scale logging and plantation establishment, new licenses are, nevertheless, being awarded by the central government because forest

resources have already been plundered in Kalimantan and Sumatra and Papua is considered to be the next frontier for extractive logging. Large-scale oil palm companies are also being lured to Papua by central government policies that allow companies to acquire 200,000 hectare concessions in Papua compared to just 100,000 hectare concessions in other regions.

If this scenario were to continue, Papua's forest resources would continue to be mined by large-scale corporations and few benefits would trickle down to local people. This scenario will inevitably result in large-scale deforestation and 'emergency type interventions similar to those now being considered for Borneo and Sumatra. Conflict between central government officials and provincial government officials over forest management authorities is also likely to continue because the central government continues to retain rights to issue large-scale logging and forest clearing permits while the provincial government argues that Papua's special autonomy status should allow provincial government officials to grant these permits.

Alternative scenarios are, nevertheless, possible and some of these are outlined below.

5.3.2 Promote community based logging in production forests

An alternative to large-scale logging and plantation development is community based and smaller scale logging and plantation development. This scenario has already been explored in Papua and is favoured by the provincial government. A brief background to this scenario is provided below.

In Papua, many have argued that Papua's Special Autonomy Law had effectively given the Papuan government the right to manage forest resource and to issue harvesting permits to customary community cooperatives within the forest estate. The central government attempted to clarify this issue in its revised decentralization laws which clearly stated that regional regulations must comply with central government policies. It has also attempted to strengthen its position on this issue by drafting a special law on illegal logging which states it is a criminal act for district or provincial officials to issue timber harvesting permits within the forest estate. Public consultations on this law have resulted in vocal disapproval in Papua province (Casson et al. 2007).

In 2001-2002, the Governor of Papua issued a number of regulations related to forestry which provided guidelines on issuing large-scale forestry concessions, industrial timber plantations and community based harvesting permits (Kopermas). These regulations effectively gave the Provincial Department of Forestry the right to issue these permits and were based on the governor's and the Provincial Department of Forestry's interpretations of the Special Autonomy Law and the central government's decentralization laws.

One of the most important provincial regulations was a Decree on the Rights of Customary Communities to Harvest Forest Products, better known as IPK-MA (Ijin Pemungutan Kayu oleh Masyarakat Adat or Timber Logging Permit for Customary Communities). This decree stated that customary communities were eligible to apply for a small-scale harvesting permit and to manage customary forests if they were formally acknowledged by the district government. This meant that they had to be

legally recognized in the form of a Customary Community Organisation (Lembaga Masyarakat Hutan Adat, LMHA) or formally affiliated with a legally constituted community cooperative.

Local communities chose to form community participation cooperatives (Koperasi Peran Serta Masyarakat, or Kopermas) to apply for IPK-MA permits from the provincial government. These permits gave them the right to manage concessions for logging in Production Forest (Hutan Produksi) areas of between 250 ha and 1000 ha (inside and outside existing centrally-issued HPH Concessions) for a one year period. During 2002-2003, the provincial government issued a total of 442 Kopermas permits. However, the great majority of these concessions failed to bring significant benefits to local communities because, lacking the capital and know how for concession management, many of the small-scale logging operations run by cooperatives were hijacked by HPH concessionaires and non HPH investors as a simple but cheap legal prerequisite for exploiting timber on traditionally owned land (Tokade et al. 2005).

In 2004, a series of meetings led the provincial government of Papua to agree to no longer issue Kopermas permits as the central government had declared that revisions to Indonesia's regional autonomy laws had made it clear that only the central government could issue harvesting permits. Following this decision, most Kopermas concessions consequently became invalid, however around 82 Kopermas continue to operate in cooperation with large-scale concessions.

The Ministry of Forestry did, nevertheless, agree to allow the provincial government of Papua to establish a joint working group to draft a provincial regulation (Perdasus) on customary management of forest resources to provide some legal basis for small-scale concessions managed by customary communities. The draft, which has already been submitted to the Ministry of Forestry for approval, aims to:

- Provides customary communities with long-term management rights over their forest resources;
- Mandate independent business development by customary communities (*Masyarakat Hukum Adat*—MHA) through forest management unit organisations (*Organisasi Kesatuan Pengeloloaan Hutan*—KPH);
- Guarantee sustainable forest management through principles, criteria, indicators and independent verification;
- Support conflict resolution through mapping of customary regions (*wilayah adat*) and land-use negotiations.

The draft stipulates that the Governor has the right to issue harvesting licenses to customary communities to ensure more effective service provision and oversight. It also stipulates that the provincial government will seek to optimize existing integrated wood industries and develop small and medium scale processing to enhance opportunities for customary communities.

The Ministry of Forestry has already amended the latest version of the Perdasus in light of ongoing revisions to Indonesia's Basic Forest Law (UU 41/99) and its implementing regulation (PP34/02). The amendments highlight significant differences between the Ministry of Forestry and the province of Papua. The most significant amendment removes the right of the governor to issue licenses to

customary communities and returns this right to the Ministry of Forestry. The power of the Governor or Regent to license processing facilities and regulate timber exports from Papua also remains ambiguous.

While a great deal of time and dialogue is required to allow this scenario to become a reality, it does appear to be a reasonable scenario that could potentially re-distribute revenue generated via logging to local indigenous Papuans and allow local people to participate in forest management. Significant support is nevertheless required to assist the provincial government with this scenario to ensure that small-scale community based logging enterprises are run sustainably, have sufficient capital to make them economically viable and are not overtaken by unscrupulous parties.

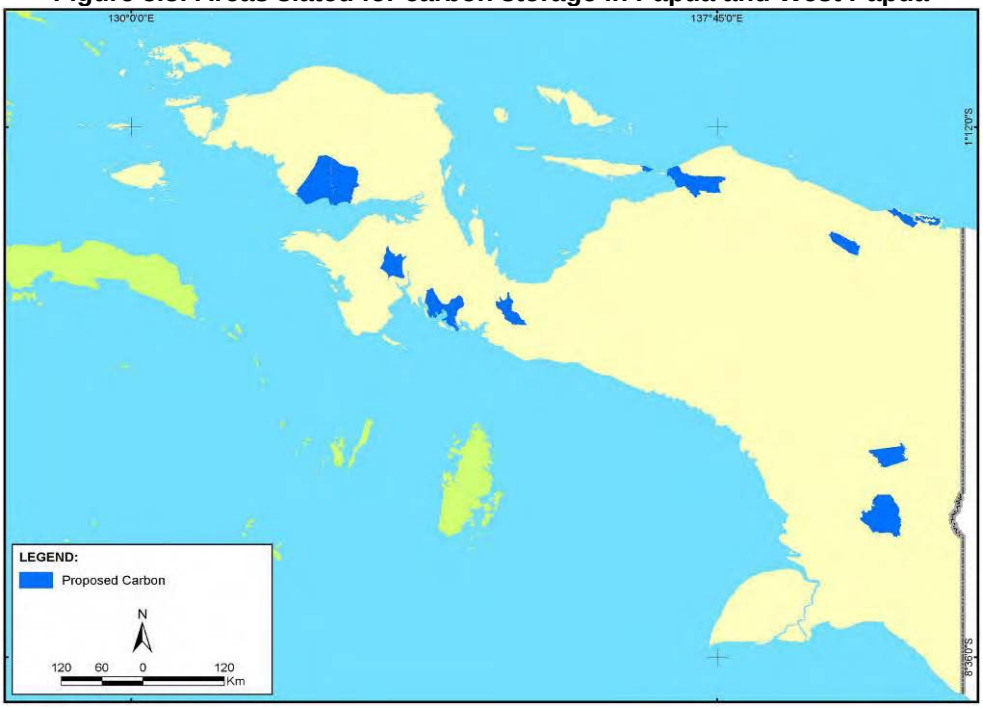
5.3.3 Allocate conversion forests for carbon storage and conservation

Papua's forests have a large potential to become world renowned as biodiversity and carbon havens. This is because:

- 20% of Papua's forests have already been recognized for their biodiversity significance and have been designated as conservation and protection forests.
- The great majority of Papua's forests store over 400 tonnes of carbon per hectare. Some forest areas, particularly those located on peat soils, contain up to 1000 tonnes of carbon per hectare (Figure 5.18).
- 22% of Papua's forests have been designated for conversion—and these forests may potentially be eligible for payments under a carbon credit scheme.

The Papua provincial government has already pledged to allocate up to 5 million hectares of conversion forest for carbon storage. At least 500,000 hectares of conversion forest have already been identified and selected for carbon storage during multi-stakeholder consultations if carbon buyers can be found (Figure 5.3). At the last United Nations Forum on Climate Change held in Bali in December 2007, the governor of Papua also stated that he is willing to not convert the majority of Papua's conversion forests if they can be compensated for the opportunity cost of not doing so.

Figure 5.3: Areas slated for carbon storage in Papua and West Papua



While a similar percentage of conservation and protected forest can not be found elsewhere in the Indonesian archipelago, it is still possible for Papua province to allocate more forest land for conservation and carbon storage than logging, mining and oil palm developments. If Papua province were to choose this option it would secure a place in the world as being a conservation and carbon storage hub.

However, before Papua province can consider this option a number of factors need to be carefully considered:

- Is there, or will there be in the future, a significant market for forest carbon storage?
- How can financing that may come available through a carbon market be directed and utilized to ensure that forests selected for carbon storage and carbon are protected from encroachment or other threats?
- How much conversion forest should be reallocated for conservation, protection or carbon storage? Where should these areas be?
- Will district with large areas of forest allocated for conservation, protection and carbon storage be able to generate income and alleviate poverty?
- Is carbon financing able to compete with logging, oil palm or mining?
- Does Papua province have the capacity to effectively manage large areas of forest for conservation and carbon storage?
- How can income generated from allocating forests for carbon storage be distributed equitably and alleviate poverty?

These questions require extensive analysis which is beyond the scope of this study. They are, nevertheless, worth careful consideration and it is strongly recommended that further research on these issues be carried out to determine if this scenario is viable. Some of this research is being undertaken under the auspices of the Indonesian Forest Climate Alliance—an alliance of donors (World Bank, Australian AID, DFID, GTZ) led by the Indonesian Ministry of Forestry, however, more specific

research should be focused on Papua to ensure that such research takes into consideration critical factors, such as Papua's Special Autonomy status. Mapping of Papua's carbon reserves stored in forests and other vegetation or soils (such as peat soils) is also necessary and should be prioritized in the near future.

It is also worth noting that although members of the conservation community often assume that biodiversity is 'good for people'—especially for poor people who depend on local ecosystems to supply many of their daily needs—it is equally clear that conventional forms of industrial development are associated with a loss of biological diversity. In a place like Papua, we should not assume that people will appreciate the benefits of biodiversity conservation if they have a 'development option' whose actual or perceived benefits will be considerably greater.

An economic assessment of the trade-offs between biodiversity conservation and economic development, or between the volume and variety of ecosystem services, obviously needs to take account of variations in the spatial and temporal scale of environmental change. The equations may differ between ecosystems distinguished at the same scale, but we must also recognize that the opportunity costs of carbon storage and conservation may be borne at a local or national level while the benefits are realized at a global level.

5.3.4 Support and promote best practice

Papua province can still continue to exploit Papua's forests in a sustainable manner if it adopts a number of best practices that are gaining prominence in world markets. Three best practices are worth considering: 1) timber certification as a means to promote sustainable logging practices and cut back on illegal logging; 2) adoption of the criteria and indicators adopted and promoted by the Roundtable on Sustainable Palm oil as a means to promote viable oil palm plantations that have limited environmental impact; and 3) High Conservation Value Forest analysis and good spatial planning as a means to ensure that suitable lands are allocated for plantation development and high conservation value forests are either conserved or subjected to limited and highly regulated extractive activities that conserve the conservation and social values found in those forests. These three practices are outlined in further detail below.

<u>Certification</u>

Certification can be used to improve the environmental, social and economic quality of forest management. It operates under the premise that environmentally aware consumers can create demand for legally obtained and sustainably logged tropical timber and, by offering price premiums for such timber, provide forest managers with a financial incentive to avoid corrupt practices and to manage the forest well.

The certified timber market constitutes around 5 percent of the total volume of world trade. Most of the demand for certified products comes from Europe (primarily the United Kingdom and the Netherlands) and the United States. Similar markets are not well developed in East Asian countries—the key destination for Indonesia's tropical timber products, particularly illegal timber. The WWF and the Nature Conservancy (TNC) are trying to rectify this situation by supporting the expansion of legally verified and certified timber products in China and Japan. Some progress within this initiative

has been made; in China major international-timber trading companies, such as IKEA, Kingfisher, and Carrefour (which account for about 1 percent of the processing and trading of furniture products in that market) have shown an intention to promote certified timber products to young customers. The WWF and the TNC are also promoting trade in certified products in Japan and Hong Kong (China) through forest and trade networks (FTNs) and are attempting to build the capacity of Indonesian producers to provide certified timber products to Asian and other overseas markets. In 2003, a producer group, Nusa Hijau (Green Archipelago), was established in Indonesia to support the latter initiative.

Nevertheless, Indonesian producers still need to be convinced of the merits of certification. Certification initiatives have not been well received by NGOs in Indonesia, and producers have stressed that the 5 percent price premium for certification is too small to entice companies to comply with certification standards. Despite a government call for all large-scale concessions to comply with certification requirements by 2003, only five large scale certified forests exist in Indonesia: PT Diamond Raya, PT Erna Djuliawati, PT Sumalindo Lestari Jaya II, PT Intracawood, and PT Sari Bumi Kusuma. None of these concessions are located in Papua. Projects working toward certification consequently need to address NGO concerns and endeavour to increase 'green' premiums and establish significant markets for certified timber in Asian countries, so that certification efforts can promote good forest governance.

A new Rainforest Alliance Program called SmartStep is helping forest managers who face difficulties trying to meet certification requirements with a step-by-step plan to gradually meet the standards. The SmartStep Program lets forest managers take up to five years to work toward the comprehensive certification standards of the Forest Stewardship Council/Rainforest Alliance. During that time, companies can promote their progress to buyers but cannot use the FSC or Rainforest Alliance seals or logos. The SmartStep Program has been endorsed by a number of large timber-producing companies, such as Home Depot, Lowe's and IKEA.

Timber consumers, such as Doorwin, have also expressed interest in sourcing certified timber from Papua and are hoping to support community based logging efforts that can qualify for SmartSteps certification program.

RSPO

The Roundtable on Sustainable Palm Oil (RSPO), which was established in Kuala Lumpur in 2003 to promote sustainable palm oil production through implementing better management practices. The RSPO is a voluntary organization comprised of oil palm producers and growers, traders, retailers and environmental and social organizations. It develops training modules for plantation managers and smallholders and monitors practices such as integrated pest management, land use planning and waste management (Streck 2006).

The RSPO have drawn up criteria and indicators to guide large scale oil palm plantations with best management practices. These guidelines restrict plantations from forest clearing, especially of High Conservation Value Forest; burning is not permitted and estates are expected to retain of restore biodiversity on and around the property. They must also control pesticide use and factory effluents, minimize

soil degradation and maintain quantity and quality of surface and ground water. An assessment of social impacts on local communities and proper systems for dealing with grievances and paying compensation is also requested, while employees must receive acceptable pay and conditions.

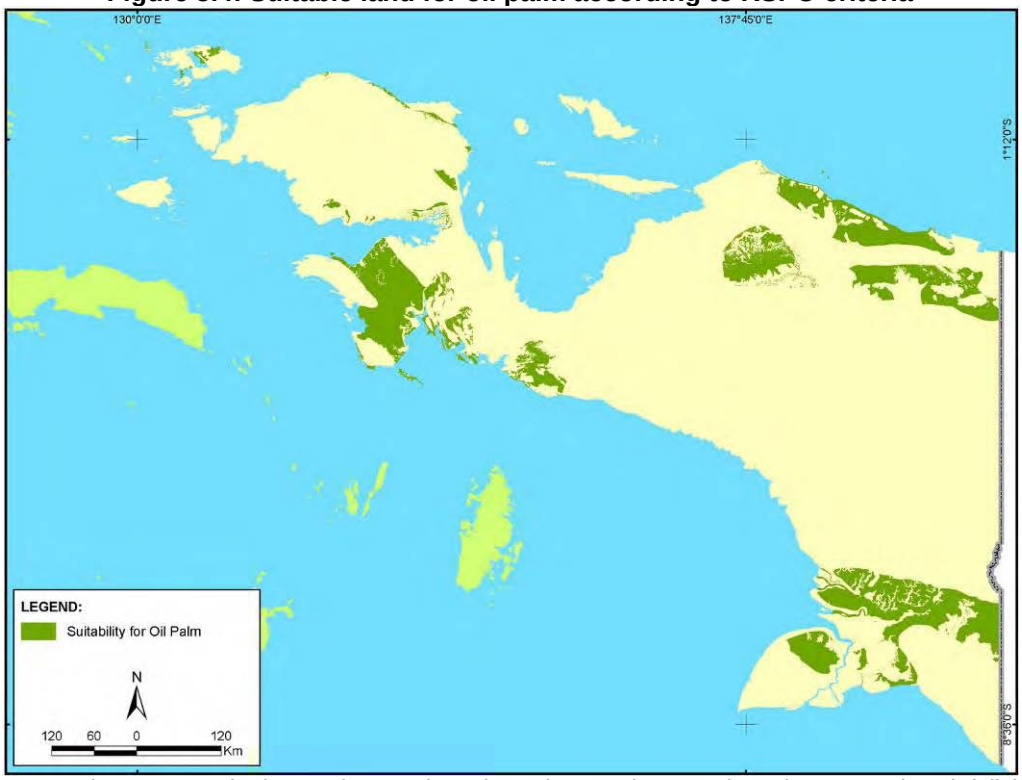
The RSPO operates under the premise that if pressure can be put on companies to change their behavior or risk losing markets, then there may be positive outcomes. Few Indonesian companies have joined so far: signatories include PT Agro Indomas and PT Lonsum, which have plantations in Kalimantan and Sumatra. To our knowledge, no established oil palm companies with concessions in Papua have joined the RSPO.

Currently, the RSPO guidelines do not include any requirements with regard to greenhouse gas balances; however the prevention of greenhouse gas emissions, such as methane emissions in sewage ponds, is given as a general goal.

The RSPO guidelines are designed to promote more sustainable oil palm production and they can also be used by the Papuan government to ensure that appropriate land is designated for oil palm. Our analysis indicates that only 3.58 million ha are viable for oil palm according to the RSPO criteria (Figure 5.4) which is a stark contrast to the 21.6 million ha thought to be viable according to the REPPPROT criteria, determined in the 1980s (Figure 5.5). According the RSPO criteria, most of the suitable land for oil palm lie in the north-east and the southern regions of Papua province. Further analysis and ground truthing is required to determine if these areas are considered of high conservation value.

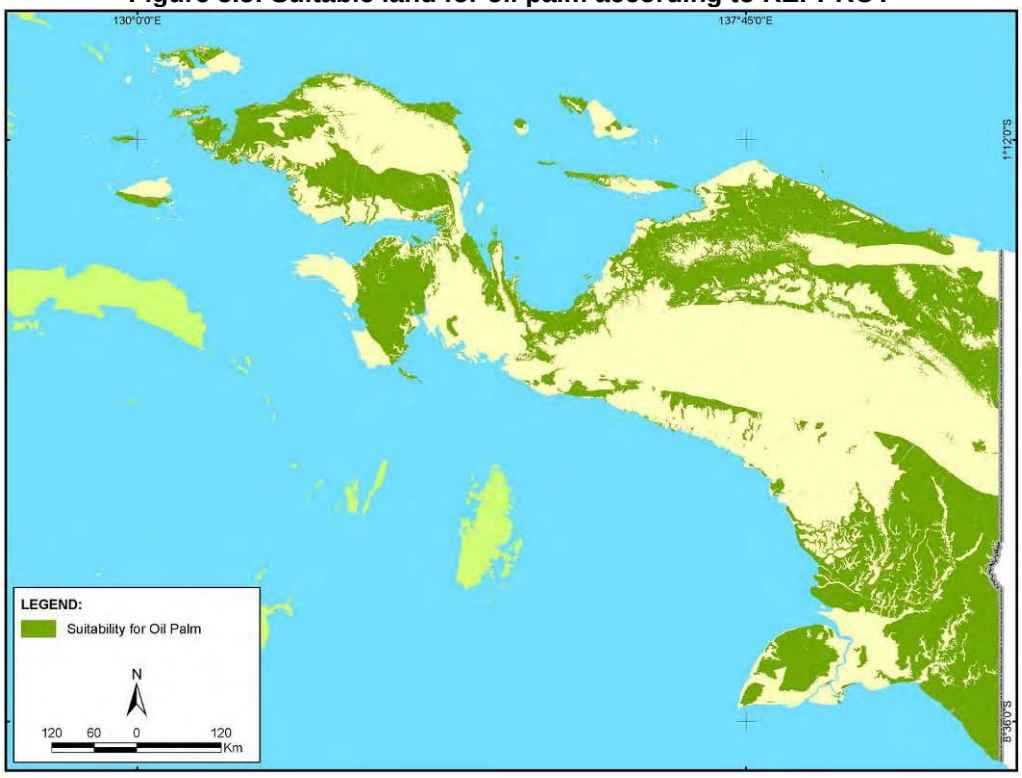
Utilization of the RSPO sustainability criteria can ensure that companies granted concessions are eligible for RSPO membership. This should potentially allow them to sell CPO to regulated markets being established in the European Union and the United States.

Figure 5.4: Suitable land for oil palm according to RSPO criteria



Note: The RSPO criteria used was slope less than 2 degrees (equal to 44.4%), rainfall less than 1500mm/year, temperature of 22-33 degrees Celsius, elevation up to 500m, no development on peat soils or within conservation or protected areas.

Figure 5.5: Suitable land for oil palm according to REPPROT



Note: The Repprott criteria specified 1) a slope of 40%, rainfall of 1500-6000mm/year, 20-30 degree temperature, elevation up to 500m, mineral soil depth more than 50cm and peat depth less than 50 cm deep.

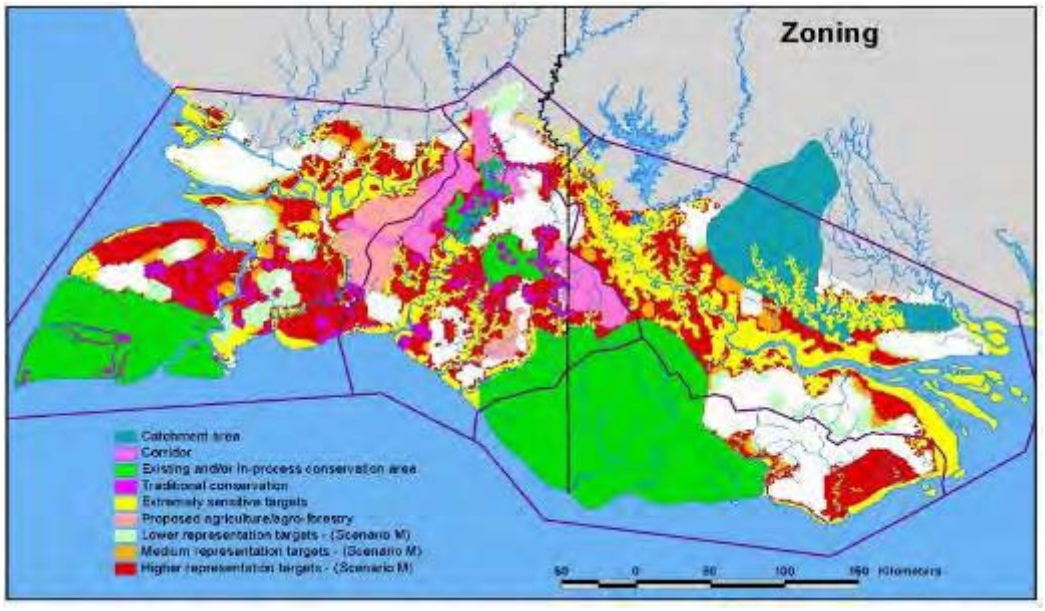
HCVF analysis and good spatial planning

The concept of High Conservation Value Forest appears in Principle 5 and Principle 7 of the RSPO standard and is intended to address the biodiversity and social aspects of sustainability. HCVF was originally invented in 1999 as part of the Forest Steward Council (FSC) standard for certified responsible forestry, but today is used in many other sectors, including plantation forestry, mining and even by commercial lenders as part of due diligence. The HCVF concept aims to identify and manage areas within forest landscapes that contain social, cultural or ecological values of exceptional importance to local and global stakeholders—the so-called High Conservation Values. Examples of HCVFs included forested hills that provide unique sources of clean water to local people, habitats that contain a high concentration of rare or endangered species, or forest products used in ritual ceremonies vital to the cultural identify of indigenous people. The identification of HCVFs in an area does not preclude forestry operations—even partial conversion to non-forest is permitted—but it requires companies to develop and implement a credible management plan to maintain or enhance the values present.

HCVF is a practical tool for enhancing the biodiversity and social sustainability of plantation operations, including oil palm and for this reason holds good potential for promoting better practices throughout Indonesia. However, this will require genuine commitment on the part of industry to conduct credible assessments, report findings in a transparent fashion, and take into consideration stakeholder views to develop feasible management plans. It will also require appreciation on the part of stakeholders who engage with the private sector that HCVF is not necessarily a tool to protect all remaining lowland forests, and that the right to assert stakeholder engagement carries with it the responsibility to do so in a productive and professional manner.

WWF has applied HCVF analysis to develop an integrated spatial plan for the Transfly region (Figure 5.6). For this analysis, HCVF was utilized to identify sites of cultural significance and high biodiversity sites. The analysis was discussed in a series of multi-stakeholder meetings and resulted in a new spatial plan for the region that accommodated HCVF criteria. This exercise took several years but it proved to be a valuable contribution that potentially be undertaken for the rest of the province.

Figure 5.6: HCVF analysis in the Transfly region



Source: WWF Indonesia.

5.3.6 Summary and recommendations

The province still has over 97% forest cover with the opportunity to become world renowned as a haven for biodiversity and carbon. Papua has a unique opportunity to contribute to the global climate change debate, and the opportunity to be on the forefront of developing new funding modalities following the decisions taken at the Bali COP in December 2007.

It is recommended that forestry scenarios in Papua start to link up with international best practices being developed (both within production forestry but also, where relevant, as sustainable palm oil production, etc.) and that Papua is proactive internationally in developing or utilizing such best practices for the development of the Province and its peoples.

If there is to be an improvement in the livelihoods of Papuans then such a debate will also need to consider how to ensure that funding provided for environmental interventions (or non-interventions in the case of non-conversion to palm oil), also reaches Papuans. To date the high economic growth figures for Papua (9% per annum over a longer period) have not had spin-offs on poverty alleviation as the centre has retained the lion's share of the funds. Thus it is recommended to explore ideas relating to carbon storage but especially how to channel the funds back to Papua for development purposes. Here international pressure (environmental lobbies, civil society, corporate social responsibility, etc.) needs to be mobilized so that the livelihoods approach remains the centerpiece of the environmental, sustainable development and climate change debate.

5.4 Mamberamo options

The Mamberamo Basin in north-central Papua covers nearly 8,000,000 hectares, including portions of the Central, Foja and Van Rees Mountains, tropical lowlands, floodplains, swamp forests, freshwater marshes and lakes (including Papua's

largest). The area has a unique geography creating a vast inland basin—the lake plains—surrounded by mountains. The Mamberamo river runs through the Van Rees and Foja Mountains and this river is sourced by the Tariku river and the Taritatu rivers.

The Mamberamo has an extremely low human population (estimated at just 12,000 inhabitants). Mamberamo communities are some of the poorest in Papua province. Their relative isolation has obviously been a major factor in causing this poverty – lack of access to education, health, transport, communications, and the marketplace have had a wide-ranging impact.

More than 95 percent of the Mamberamo region is forested, making it the largest and least-disturbed tropical humid forest watershed on the island of New Guinea, and a storehouse of globally significant biodiversity.

Mamberamo Basin

The Foja Wilderness is part of the great Mamberamo Basin, the largest unroaded tropical forest in the Asia Pacific region. As the global community searches for solutions to climate change, large untouched forested areas such as these will become more and more valuable as essential carbon sinks.

The cutting and burning of tropical forests worldwide emits at least 20 percent of total global greenhouse gases. Protecting these forests minimizes the impact of climate change while providing direct benefits to local populations, such as fresh water, clean air, food, seed dispersal, pollination and sources of medicines.
Source: Conservation International.
http://www.conservation.org/newsroom/pressreleases/Pages/12170701.aspx

This region has been considered for this assessment because of its biodiversity significance and because a mega-dam project has been proposed for the area.

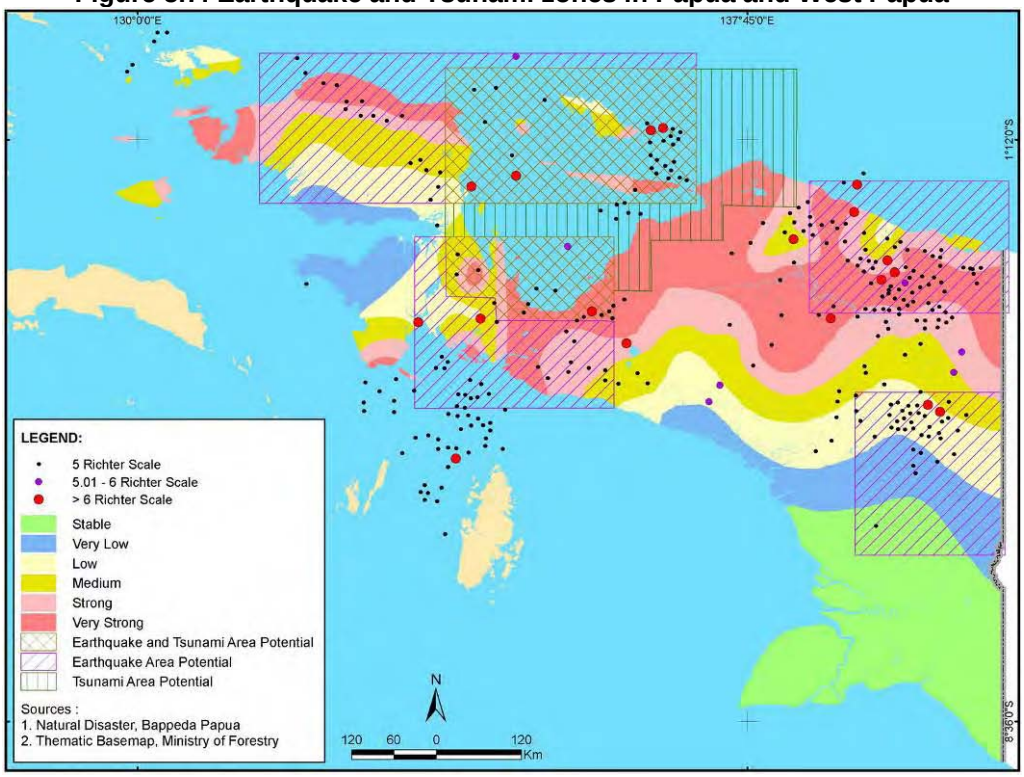
5.4.1 Business as usual option

Large areas of the Mamberamo region have been allocated for logging and mining exploration. The government has also planned to establish one million ha of oil palm in the region and to expand sago plantations for food and biofuel production. A large hydroelectric scheme has been proposed to produce up to 20,000 Megawatts of electricity by damning the Mamberamo, Rouffaer and Idenburg rivers; and an extensive road network has been proposed to link up all of the major towns and cities in the district.

If all of these developments go ahead as planned it is predicted that at least 50% of the Mamberamo basin will be flooded and vast areas of biodiverse lowland forest are likely to be lost to logging and encroachment. Access to isolated regions may be improved by new an extensive road network; however, these roads will only serve a limited population. The main beneficiaries of the current Mamberamo road plan are likely to be logging and mining companies rather than the rural poor. A large infrastructure project, such as the Mega-dam project, will also attract migrants to the area and potentially marginalize indigenous inhabitants.

Finally, it has been pointed out that the Mamberamo dam project is potentially hazardous because the northern region of Papua is prone to earthquakes (Figure 5.7).

Figure 5.7: Earthquake and Tsunami zones in Papua and West Papua



Alternative scenarios, such as those mentioned below, can potentially be considered for this important region.

5.4.2 Conserve the Mamberamo region for biodiversity and carbon

A large percentage (66%) of the Mamberamo basin has already been designated as conservation and protected forest according to Papua's latest land use plan. This spatial plan could potentially be revised to allow the entire Mamberamo basin to be designated as conservation or protected forest. This would help to keep the Mamberamo lowland forests intact and to promote the region as an area of global significance. This scenario might be considered extreme but it can potentially be justified by the following:

1) The Mamberamo basin is home to one of the few remaining intact lowland forests in the world and is therefore extremely valuable from a global biodiversity perspective.
2) The Mamberamo basin is known to contain extraordinary biodiversity of global significance.
3) The Mamberamo basin has a low population density.
4) Forests in the Mamberamo region potentially contain approximately 3,923 million tonnes of carbon.

If this scenario is considered to be too extreme, the Papua government could support the creation of a biodiversity 'conservation corridor' covering 4,500,000

hectares by linking existing nationally protected areas with traditional reserves, to secure protection for targeted species and habitats. The biodiversity conservation corridor approach aims to maintain critical ecological processes within the corridor. It is envisaged that within this corridor, the natural resources (watersheds, rivers, wetlands, forests and biodiversity) and their intrinsic environmental values and services will be managed by empowered local communities, governmental and non-governmental agencies, and the private sector. International environmental groups have identified critical habitats and will continue to encourage sustainable management of areas surrounding them through the promotion and establishment of traditional agreements, village regulations and changes to the local. The focus here would be on combining conservation and poverty alleviation agendas for the indigenous peoples living in the area.

Environmental groups, such as Conservation International,[6] who have been active in the area for many years, have been engaged in stakeholder discussion with communities living in an around the Mamberamo and the Foja Mountains, with government officials and with indigenous communities, using Multidisciplinary Landscape Assessment (MLA) tools. The idea has been to build on information derived from grassroot approaches which will benefit planners and decision-makers, and attempting to arrive at a convergence between local community and government interests. Clearly the work already carried out through the MLA should form a basis for the further development of a Mamberamo scenario.

Mamberamo biodiversity conservation corridor

Building on this corridor approach and in response to the growing concern about climate change, Conservation International has already begun establishing a carbon project in the Mamberamo. CI is designing a carbon-offset project which will avoid the designation and sale of logging and oil-palm concessions in Mamberamo and will fund conservation agreements with local communities. The destruction of Indonesian peatlands and forests release five times as much CO2 as the country's non-forestry emissions, and the nation is now the third-largest emitter of greenhouse gases in the world. By avoiding further deforestation in the Mamberamo Basin, CI and partners are working to reduce the impact of Indonesian forests on global climate change and preserve valuable habitat for biodiversity.
Source: Conservation International. http://www.conservation.org/explore/regions/asia-pacific/papuaprovince/Pages/results.aspx

Both scenarios would fit into the climate change debate following the Bali conference as an avoidance of more carbon emissions and could count on the support of the international environmental lobby.

5.4.3 Allow carefully planned exploitation and development

Spatial analysis of the Mamberamo regions timber potential has revealed that there are a few areas that could be prioritized for logging because these areas have low extraction and transportation costs and potentially contain high value timber species. Sustainable logging appears to be a viable option for these regions.

Oil palm developments do not appear to be very viable for the Mamberamo region because most of this region has rainfall over 3,300 mm per year. An area of just 182, 194 ha was determined to be suitable for oil palm by PT Wesitan, a consulting company that recently reviewed spatial planning for the Mamberamo region.

[6] http://www.conservation.org/explore/regions/asia-pacific/papuaprovince/Pages/results.aspx

Timber plantations are also not viable for the majority of the region and this is partially evidenced by the fact that no timber plantations have been established in the region.

Sago development has more potential in the Mamberamo region than oil palm because it can thrive in high rainfall areas. Around 1 million ha of land was determined to be suitable for sago cultivation. Sago can also be used to make bioethanol.

There is enormous mining potential and up to 82 percent of the Mamberamo region has been allocated for mining exploration. The mountainous region to the south of the Mamberamo basin is rich in minerals, including gold, copper, bauxite and nickel. If one area in the mountainous region is found to contain a valuable and economically viable mine deposit it may be possible to focus development only on this area and to conserve the majority of the regions forests for carbon storage and biodiversity.

Plans exists for a number of roads projects which will affect the area (including a coastal road from Sarmi to Nabire). However, most of these roads will be difficult to build and maintain. They will also be costly and will potentially divert funds away from health and education. More strategic transport options should be considered. These options should focus on expanding harbors in key coastal regions and on major rivers, such as the Mamberamo river and navigable tributaries. Air transport can also be considered. The road plan currently proposed by PT Wesitan would be extremely difficult to build, costly and result in considerable deforestation.

5.4.4 Identify alternative electricity providers

The Mamberamo dam project is expected to generate up to 20,000 Megawatts of electricity. This electricity would supposedly be used to fuel an immense industrial estate in the coast district of Waropen with metal smelting works, sawmills, agribusiness plantations and petrochemical processing factories.

The damming of the river and the development of the mega-project around this, has been loosely estimated as being in the region of USD 6 billion, and is likely to stretch over a 20 year period, involving the immigration of large numbers of people.

Is this feasible or necessary? To answer this question it is worth pointing out that the Mamberamo dam project is predicted to produce more power than a nuclear power plant. It is also worth pointing out that only 32, 222 KWH was used in Papua province in 2005. There are also several mining, and oil and gas areas that generate large amount of captive power for their industries and the settlement where the employees live. The Freeport mine, for example, produces 250 – 380 MW, more than twice of the entire province's peak demand, while the surrounding areas lack electricity supply.

At this stage, therefore, it seems unlikely that there is sufficient demand for power to warrant such a project.

Provision of electricity to the rural poor should be a priority for the Papuan government and a recent report prepared by the World Bank has estimated that

approximately 20 MW is needed in order to provide this. It also recommends the following strategies to provide electricity.

Households and electrification options	Electricity needs (KwH/year)	Additional Generation needs (MW)	Planned Additional Capacity (MW)	Source of additional capacity (MWO	Deficit capacity (MW)
Near grid-grid extension	246,240,000	35	39	Crash program and Genyem hydro	0
Far from grid-mini grid	71,820,000	18	0	No program	18
Remote area-isolated grid (pico/microhydro)	2,736,000	1	0	No program	1
Remote area-isolated grid (PV)	684,000	0.2	0	No program	0.2

World Bank (2005).

The key to providing adequate power to Papuans will be to combine existing generating capacity with new capacity, with existing private capacity (e.g. Freeport PT), and with extensions of the electricity grid, where this is feasible. And in those areas where this is not economically feasible, to look for smaller, stand-alone solutions (e.g. small mini-grids not connected to the main grid).

It could be considered to provide more support the PLN generation program especially the coal fired power plant crash program. However here it would be important to start to use improved, more environmentally friendly coal-fired technology rather than continuing with outdated and polluting technologies.

Separately, it will be important to launch the rural electrification program to provide electricity access to households in remote areas. Depending on the energy resources available and the density of rural/isolated populations, the program could be based on micro-hydro or solar PV home systems. For solar PV program, the local government could start with the provision of electricity and public TV or radio at community centres and at the household level and providing a mobile battery charger while at the same time training the community on O&M of the PV system.

5.4.5 Summary and Recommendations

The Mamberamo basin is a unique area containing extraordinary biodiversity of global significance. Plans to open up this area to large scale mineral exploitation and construction of dams for generation of hydro-electric power generation have already met with global protest likely to be mobilised again if such plans are taken up again. This would not match very well with Papua's newly acquired positive environmental image

In addition, the history of mineral exploitation so far does not suggest that power generation is likely to have any impact on provision of electricity to the rest of Papua (Freeport PT is a good example of excess unused capacity). Therefore, as regards generation of electricity, other options should be explored to harness existing unused capacity and to increase the capacity of existing of existing plants (while upgrading them to be more environmentally friendly). Location of cleaner power sources –

especially hydro-electricity – need to be focussed on providing electricity to Papuans and need to be linked to expanding the coverage of the grid; rather than being single-source power plants for extractive industries.

It is recommended that the Mamberamo basin be conserved as an area of significant global biodiversity, while combining conservation with poverty alleviation agendas for the indigenous communities living in the area, with local communities and local governments developing, monitoring and enforcing management plans.

6. SCENARIO ASSESSMENT

The previous chapter introduced a number of potential development options as part of a broader scoping exercise. This chapter will attempt to focus these options into a "business-as-usual" scenario and a "sustainable development" scenario. This exercise has been carried out for the four spatial/sectoral intervention options identified in the previous chapter, namely:

- transport and access
- mining
- forestry; and
- Mamberamo.

This section is also trying to translate the future land use practices into terms and quantities that can be presented and discussed in the language of development and spatial planning. Using limited empirical findings, this section quantifies the value of social and environmental impacts of the two different scenarios. Estimated values are then employed to compare these scenarios.

Our approach toward informing land use decisions takes a step around this problem by showing, for example, what value would need to be placed on environmental/social factors (including non-market and intangible benefits) to render the existing or traditional land use practices equally or more valuable than economic development activity alternatives. Showing the relative size that these values would need to assume is a significant first step toward establishing a basis for land use decisions that recognize the significance of environmental/social costs and benefits.

It is important to note that these figures are very preliminary and based on the easily available data and information with robust assumptions, therefore, the usage of these figures were only purposed for this study only to show the general empirical consequences of the different development scenarios. Further empirical analysis that supported by more sophisticated and updated data and information is necessary to be taken whenever detailed and deeper analysis is needed.

6.1 Business-as-Usual Scenario

6.1.1 Transport and access

Under a business as usual scenario approximately US$59 million will be allocated to develop a major road network through the populated highland regions. A road will also be developed to link Enarotali to Timika and from Timika to Mulia and from Wamena to Mulia. These three road developments will provide a road network that will link up Jayapura to Nabire via the highlands. A major road network will also possibly be built in the Mamberamo region and a Southern Highway has been proposed to link Timika up with Tanah Merah.

Economic consequences

Development agencies, such as the World Bank and the Asian Development Bank, have funded road developments because studies show that they have improved access to remote areas and facilitate the provision of health and education services.

For instance, Laufa (2005) has shown that the construction of the 81km long Bereina-Malalaua Highway (completed in 2000) through the previously road-less and isolated eastern Gulf Province in PNG had measurable, generally positive socio-economic effects of the people living there, especially through facilitating the supply of betel nuts (a major and highly lucrative cash crop) to Port Moresby. The ADB also undertook a comprehensive study of roads built in Indonesia, the Philippines and Sri Lanka and determined that people living in areas along roads benefited substantially from the social impacts of rural roads through access to state services in sectors such as health, education, rural extension and provision of information. However, the study also showed that rural roads alone were not enough to tackle poverty, and that this could best be done through integrated projects where the road was one part of a larger program of support, rather than a sector road investment on its own (Hughes, 2005).

Nevertheless, in Papua province, difficult geographic situations plus a relatively low population density compared to other regions in Indonesia, mean that a major investment in roads is costly, time-consuming and difficult to justify. For instance, in the newly created district of Pegunungan Bintang, road construction had to be postponed for almost a year a materials and machinery had to be flown in part by part to Oksibil's airstrip, which can only accommodate small Cessna planes (World Bank 2005).

There also is a real danger that major road building will divert development funds from other essential activities, and that the roads when built will be under-utilized and will quickly fall into disrepair.7 Road density (ratio of length of road to size of area) in Papua is one of the lowest in Indonesia, at 0.04km/km2, far below the national average of 0.17km/km2.

Environmental consequences

Roads have been identified as a critical determinant of forest loss around the world. Roads increase access to greater areas of forest, and lower the transport costs for loggers, farmers and estate crop companies. The result is increased wildlife hunting, increased logging, and increased forest conversion. The effects can extend a considerable distance from the main roads themselves, as logging roads and local feeder roads splinter out into the surrounding forest.

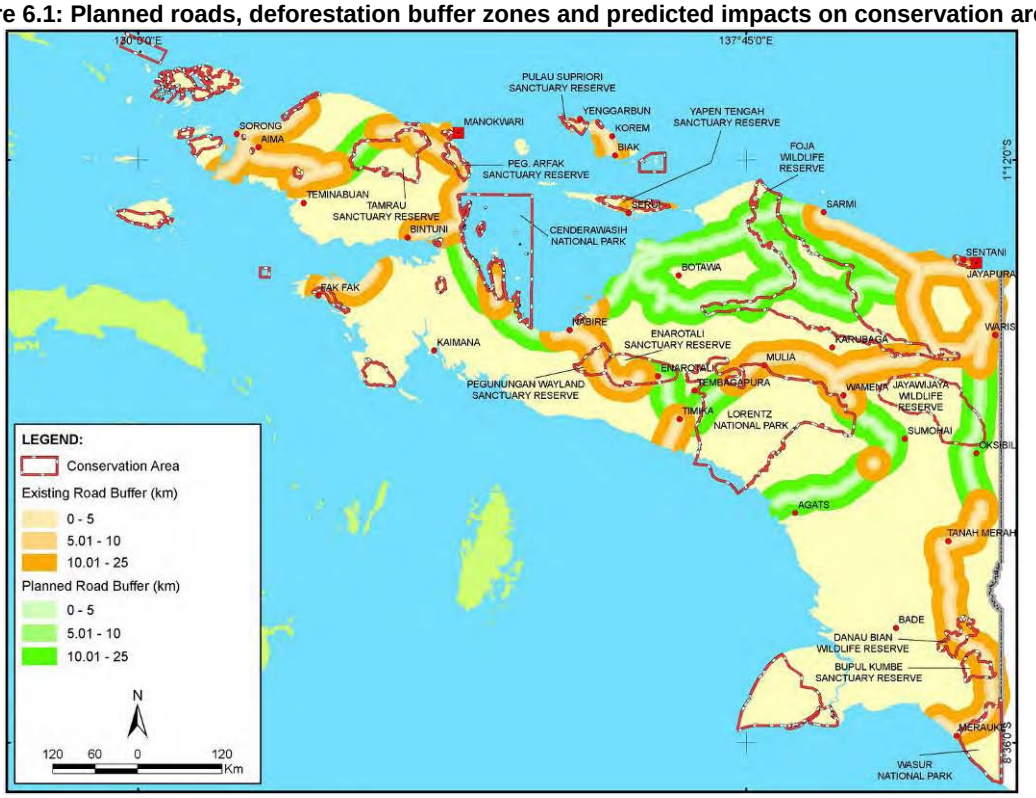
In order to estimate the extent and influence of the road network, buffer zones of various widths, have been mapped along the current and planed infrastructure. Buffer zones were delineated for zones of influence measuring a total of 5 km, 10km and 25km. These buffer zones were drawn from spatial analysis of the impact of roads in the Brazilian Amazon (Asner et al 2006). This analysis demonstrated that forests within the 5km buffer were likely to become deforested and that logging was likely to occur within a 25km radius of the road.

Analysis of these buffer zones indicates that large areas of forest (up to 8.4 million ha) could be threatened by Papua's road plans. Most of this forest (4.6 million ha) would be lowland forest. The Mamberamo road plan would have the greatest impact and potentially affect 3.5 million ha of lowland forests. This road plan runs through

[7] This viewpoint was already expressed in the earlier study: A Framework for Provincial Development. Draft Final report, Vol 1. June 1988. p.160). The recent Papua Public Expenditure Review, 2005 draws the same conclusion.

the Mamberamo nature reserve and would significantly affect this area. The road linking Tanah Merah to Jayapura could also potentially result in the loss of approx 0.9 million ha of lowland forest and the road linking Enarotali to Timika and Mulia could potentially affect 0.35 million ha of lowland forest. This road would also potentially pose a threat to the Lorentz World Heritage site as it borders the park and the 25km buffer zone falls within the parks boundary. Overall, about 2,139 km (91.5%) of the business-as-usual road network will pass through forested areas (Figure 7.1).

Figure 6.1: Planned roads, deforestation buffer zones and predicted impacts on conservation areas.



The proposed highway to link up Wamena with Agats will also have disastrous environmental consequences because it will border Lorentz World Heritage Site and go through deep peat soils that contain high levels of carbon. The highway will be incredibly difficult to build, if not impossible, because it will cross numerous rivers and streams (many navigable into the interior) flowing north-south down from the highlands. It will also lead to significant carbon emissions that will increase global warming. This road also appears to be economically unviable as it will cost more than USD 40 million (based on an estimated distance of 700km at USD 60,000/kilometer—both costs and distance need checking and the real figures are likely to be much higher because of the swampy conditions and the number of bridges that will need constructing). This road is likely to have disastrous effects on the peatlands and on the Lorentz park with very little benefit to the scattered and isolated communities living in these districts.

The road linking Wamena to Mulia would not significantly affect forests, however, it would traverse very inaccessible areas with low population density and would be costly to maintain, unless off-set by increased traffic volume between Wamena and Mulia.

Social consequences

Well maintained roads may provide better access to health and education services and provide better market access, however, these roads may also bring with them a host of problems. Roads have been known to be linked with migration, the spread of HIV/AIDs, prostitution and a host of other social problems that will need to be carefully managed. It is also worth mentioning that it is difficult to justify the amount of money presently allocated for roads as this amounts to about IDR 910,000 (USD 100) per person each year compared to the water and sanitation budget of IDR 16,380 (USD 1.8) (World Bank 2007).

6.1.2 Mining

Under a business as usual scenario, mining exploration will continue on a large scale, including exploration within protection and conservation forests. This exploration is likely to result in a number of large mining developments similar to the Rio Tinto mine and the BP Tangguh Gas Project.

Small-scale artisan mining will also continue, particularly around existing mine developments.

Economic consequences

There is little doubt that large scale mining will bring in substantial revenue for local and provincial governments as well as for the central government because Papua is rich in valuable mineral deposits, such as gold, silver, copper, natural gas and oil. The Freeport mine is thought to have generated US$ 1 billion in revenue and the Bintuni Bay BP project is expected to generate US8.7 billion in revenue. Another few large-scale mining projects of similar scale to either Freeport or Bintuni could certainly allow Papua to generate significant revenue for local development.

However, there is no guarantee that funds generated from large-scale mining will be equitably distributed or channelled into education, health or public infrastructure. In the past, revenue has benefited a select elite and resulted in corruption and conflict. The extraction of mineral resources from Papua has created an economic windfall for many; however, this wealth has not been distributed among the poor and is concentrated in a few districts. In Mimika district, where the Freeport mine is located, there is a GDP per person of around US$9000, but in the populous regency of Jayawijaya GDP per person is around US$60. The mining boom has also encouraged urban development. Papua's urban areas are among the top few wealthiest regions in Indonesia, while Papua's rural areas are the poorest in all of Indonesia (Cannon 2007).

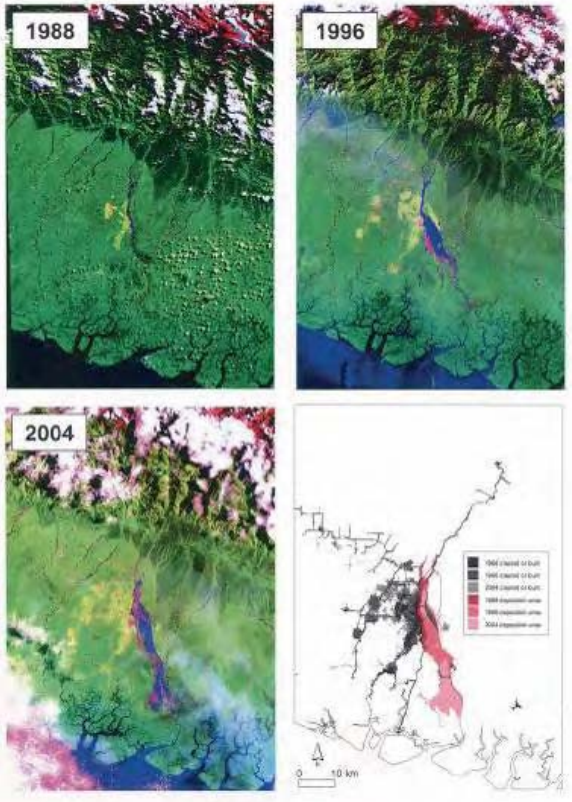
No significant changes have yet been made to ensure that this would not continue to be the case. Papua's Special Autonomy law enables Papua to retain 80% of the revenue generated from mining but an effective and transparent governance structure has yet to be established to ensure that these funds can be utilized to alleviate poverty and bring equitably prosperity to Papua. In addition, under present legislation, central government retains the tax revenues, whilst royalties are shared. As the proportion of taxes versus royalties is strongly weighted in favour of taxes (Figures from 2006 show, for example, that PT Freeport contributed US$ 1.1 billion to central government in the form of taxes; whilst the 80% share of the royalties paid to Papua amounted to US$ 65 million).As long as all taxes are retained in Jakarta

there will be a tug-of-war between Central and provincial government as it is not in the central government interest to reduce mineral exploitation). The logic would be that if the percentage share of royalties to the province is increased, then the volume of minerals exploitation does not need to be increased. This would suit the Province; but, it is not sure that Central Government would share this view.

Environmental consequences

Large-scale mining has been linked to deforestation in Papua. For instance, rapid deforestation has occurred downstream of the Freeport mine because the mine has attracted migrants and led to road developments (Figure 7.2). Both of these have attracted investors to the area and opened the area up for oil palm developments, logging and industrial timber plantations. The area of cleared and settled land in 1998 was approximately 44km^2, however it reached 158km^2 in 1996 and 203 km^2 in 2004. The clearing mirrors the growth of the population within the Freeport CoW area, which increased from approximately 50,000 in 1990 to 120,000 in 2002 (Ballard, 2005).

Figure 6.2: Satellite imagery of deforestation in the Freeport mine area



Source: Paull et al. 2006.

Concern has also been raised about the fact that 1.9 million ha of protected and conservation forest have been allocated for mining in Papua and another 4.6 million ha of protection and conservation forest has been allocated for exploratory mining.

Nevertheless, while the construction of large-scale mining operations and associated infrastructure may involve some clearance of native forest the disposal of waste materials tends to constitute a bigger threat to local ecosystems (Filer 2007). Mines in coastal areas have been allowed to dispose of tailings and other waste materials

onto the adjacent seafloor, while those in the hinterland have been discharged into local river systems. Both practices have been justified by climatic and geophysical conditions that militate against the construction of tailings dams and permanent waste dumps (Filer 2007).

In coastal areas, sedimentation from mine site run-off and the dumping of waste rock from barges has caused coral mortality (as evidenced by the Lihir mine in PNG). The disposal of tailings into rivers has also caused aggradation of river beds and led to overbank flooding, which has resulted in dieback. The release of toxic metals into the river system also threatens the health of humans and wildlife.

The Freeport mine, one of the largest mines in the world, stores half a million tonnes of hard rock waste in the headwaters of the Ajkwa river catchment every day and 195,000 tonnes of tailings are transported downstream to a 'deposition area' whose size has grown from 16km2 in 19988 to 166 km2 in 2004. The size of this area would already be much greater if it were not for a series of containment levels built by the mining company, some of which now reach a height of 15 metres. Since the mine is expected to operate for another 35 years, the area affected by the process of sedimentation and heavy metal deposition will eventually be much larger (Filer 2007). The Kamoro people, who live downstream of the Freeport mine, have lost access to extensive areas of forest, rivers and sago stands as the result of sedimentation (Ballard, 2005).

Small-scale mining is also a problem. The most persistent impact to freshwater ecosystems from small-scale mining arises not from physical disturbance to streambeds, but from the mercury used in the mining process. Mercury is used to extract gold from black sand either in between the sluice-box compartments or via simple panning. In Papua, local mercury pollution is now occurring in the Timika and Nabire area due to illicit gold refining operations. Being non-soluble, mercury remains in river sediments indefinitely, and may be difficult to detect, since it is possible for river water to flow clear of mercury even when high levels of mercury are present in the river bed. Such mercury contamination, however, frequently enters the riverine food chain, where it is amplified through successive trophic levels, eventually posing severe risks to local human populations who consume fish and crustaceans (Filer 2007).

Social consequences

In the past, large-scale mining has resulted in conflict, violence, disempowerment, poverty and health problems in Papua. These problems have been primarily documented in relation to the Freeport mine located in Timika district. Most of these problems arose because the mine was established during the Suharto era and was backed up by the Indonesian military. During this time, the mine was not required to consult the local community or heed their concerns. Local people were intimidated and controlled to protect the interests of the mine.

6.1.3 Forestry

Under a business as usual scenario, Papua's production forests will continue to be logged by large-scale logging corporations in an unsustainable manner that results in wide-spread forest degradation and deforestation, similar to what has already occurred in Sumatra and Kalimantan.

If careful planning occurs, Papua's conversion forests (6.3 million ha) will potentially be converted to oil palm, industrial timber plantation or other profitable land uses. However, if it does not, there is a risk that the great majority of Papua's conversion forests will become vast degraded wastelands covered in imperata grasslands.

Without good management of national parks and protected areas, internationally globally recognised areas, such as Lorentz National Park and the Mamberamo wildlife region will encroached upon and subjected to illegal logging.

Economic consequences

Currently, large-scale logging is generating approximately US$4.34 million for Papua province. Revenue generated from this sector has gradually be declining because large-scale logging has become embroiled in conflict, has not benefited local communities and is not controlled by the provincial government or district governments. It is instead controlled and regulated by the central government who retains the right to issue large-scale logging permits and to determine cutting rates.

This was clearly shown in a CIFOR study which examined the impact of special autonomy on Papua's forest sector (Tokede et al. 2005). This study stated that:

- Up until 1997, 59 logging companies produced almost 1.2 million m3 of timber per annum. However, after the 1999 economic crisis, gross timber production declined and the introduction of Papua's special autonomy law, gross timber production fell sharply by 17.43% to just over 1 million m3 in 2001 and by 42% to two–thirds of a million m3 by 2002.
- Between 1993 and 2002 recorded regional revenue from Papua's forest sector totalled an average of US$1.34 million per year, or 6.7% of the annual regional revenue generated from Papua. However, in 2002, a year after the introduction of special autonomy, the recorded forestry sector contribution to regional revenue was a mere 2.8%.
- Figures from the Provincial Forestry Office of Papua show that in the period between 1993 and the start of the monetary crisis, HPH concessions were exploiting around 1 million ha of forest per year, however in 2002, this figure had fallen to 535,769 ha (Tokede et al. 2005).

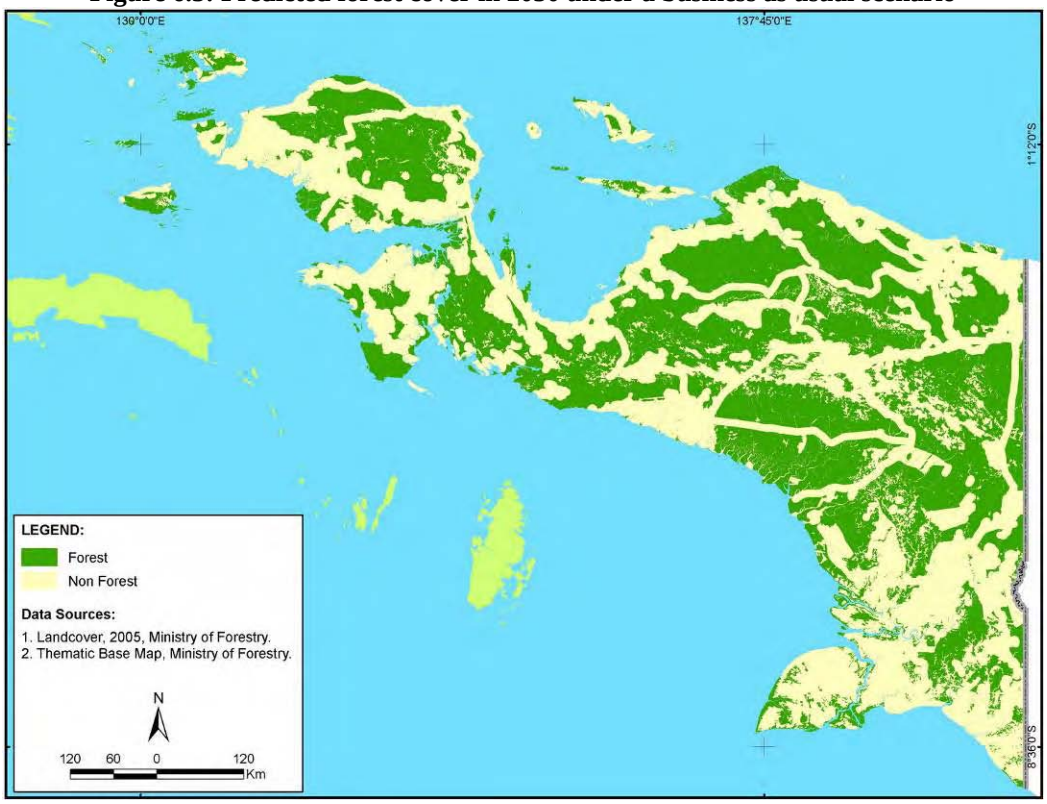
Until recently, revenue generated from large-scale logging has primarily been directed to the central government. This is supposed to change with decentralisation and Papua's Special Autonomy law, however conflict over permitting rights and rights to forest resources is hindering the logging activities of large-scale concessions in the region. Overall, this has resulted in a marked increase in illegal logging which only tends to benefit those directly involved and result in distorted timber prices that do not reflect the true value of forests.

Environmental consequences

To date, large-scale logging has not had a significant impact on Papua's forests as forest change maps only reveal minimal deforestation compared to Sumatra and Kalimantan. Nevertheless, if large-scale logging is allowed to continue, the majority of Papua's conversion forests are converted to other land uses (such as oil palm) or are simple clear-felled and planned road developments go ahead with an estimated

5km buffer zone, substantial deforestation will inevitably occur in Papua (see Figure 6.3).

Figure 6.3: Predicted forest cover in 2030 under a business as usual scenario



Note: Assumes that all forests classified as conversion forest are converted to other land uses and that all planned roads are built and result in a 5km buffer of forest loss.

Social consequences

The main social consequence of the business as usual scenario will be continuing conflict between the Papuan governments and the central government over forest use rights and revenue allocation. Decentralisation and Papua's Special Autonomy law appeared to give the Papuan provincial government greater rights to manage its forest resources and it consequently embarked upon a strategy of issuing small-scale logging permits to cooperatives formed by customary communities. This strategy has been debated by the central government who claim to still retain the right to issue large-scale concessions and to control Papua's forest estate.

Moreover, local people with customary rights to forest resources will continue to be denied the right to access, use and economically benefit from their forest resources. This will also result in conflict, disempowerment and discontent.

6.1.4 Mamberamo

Various plans to develop the Mamberamo region have long been discussed and tabled. They include: developing a large hydroelectric scheme by damning the Mamberamo river to produce up to 20,000 Megawatts of electricity; establishing 1 million ha of oil palm, continuing to allow large-scale logging and perhaps also small-scale logging, and developing a large road network which will go around the Van Rees and Foja Mountains to link up all the major town and cities in the district. Most

of these plans have been discussed as viable options in the most recent spatial plan carried out for the Mamberamo region by PT Aditya Engineering Consultants.

Economic consequences
The damning of the Mamberamo river will probably result in considerable revenue and development in the region if the dam can be established and is actually able to produce up to 20,000 MW of electricity. The excess electricity generated from this project could potentially be sold on to various industries and allow mines and processing mills to operate and process natural resources with the use of low-cost power. The development of these industries could potentially offer employment and bring prosperity to the region.

However, the construction of a mega dam in the region will be technically difficult and there is no guarantee that it will be able to generate such a large amount of electricity. There is also no guarantee that investors will be interested in moving into the region to develop down-stream processing plants. The risk is that substantial revenue (approx $US 6 billion) could be spent on this development without a guaranteed return. This could potentially propel the Papuan government into significant debt. There is also a risk that widespread international condemnation of the project will result in substantial problems that will hinder its construction and make it economically unviable.

Environmental consequences
A comprehensive environmental assessment of the Mamberamo dam project needs to be undertaken, however, it seems likely that the mega dam project, plus the other developments planned for the region (i.e. road development, oil palm developments, logging, mining etc) will result in substantial flooding and widespread deforestation.

Social consequences
The mega-dam project is likely to result in the forced movement of local communities and to result in substantial social conflict. Other developments, such as the road development and the region's oil palm plans, are also likely to result in substantial migration which will result in the disempowerment and marginalisation of indigenous communities residing in the region.

6.1.5 Economic impacts of the business-as usual scenario

To varying degrees, alternative land use practices in the business-as-usual scenario is believed to continue to rely upon the exploitation of Papua's natural resources, mainly forests and minerals. These practices will support the development of the local economies which are estimated to be over 6% of Gross Domestic Regional Product (GDRP) per annum for this scenario. The rough projected estimation of the GDRP in 2020 based on the forestry scenario alone will result in a GDRP of $US 5,793 million in the year 2020 (based on the year 2000 constant price as the most readily available data).

This preliminary figure above does not take into account the environmental and social costs resulting from this development practice. Taking into account these costs will result in a 'green GDRP' which will factor in the depletion of natural resources and environmental degradation to support business-as-usual development practices. The corrected 'green GDRP' for 2020 where the above conventional

GDRP deducted by the environmental and social costs associated could be in the order of $US 4,661 million for the year 2020.

The regional per capita income of this scenario could be in the order of $US 1,654 in 2020 for approximately 2.8 million people if we assume that the population will continue to grow at the current level of 2.6% per annum.

6.1.6 Social impacts of the business-as-usual scenario

Economic activity to generate goods and services incurs costs not only to the private parties involved in production and consumption (known as “private costs”), but also to the general public (known as “social costs”). Social costs include costs of pollution, depletion of natural resources or degradation of the environment.

As these costs are often not included in prices paid by consumers and producers, they are borne by society as a whole. The failure to consider these “external costs” in private decision-making could be corrected through the prudent use of green accounting, by including them in the prices of goods and services, so as to convey more accurate market signals.

Liquidating merchantable hardwoods diverts the potential values of the forest products and services that support the livelihoods of Papuan people who are still implementing customary forests management systems through hunting and gathering. These social costs are not accounted for in the traditional national and regional domestic account; therefore the GDRP should be corrected accordingly.

The proxy estimation using benefits transferred from other studies on forestry and the direct social benefits lost (which consists of fuel wood, non-timber forest products, and water consumption) is estimated to be around $US 343 million in 2020. This calculation is based on several secondary data that attempt to place a value on tropical forests in Indonesia and accounts for necessary price adjustments. The secondary data sourced from provincial statistical publications, such as Papua Province in Figures (BPS, 2007), spatial data for forest cover predicted major degradation will occur in conversion forest and 5 km from roads in 2030 (see Figure 7.3) and the total economic value of forest resources from several studies (IPB, 1999; Simangunsong, 2004; and Kim, 2002).

6.1.7 Environmental impacts of the business-as-usual scenario

The quality of the natural environment and economic well-being are so closely interwoven as to be invisible until a crisis arises.

In the current society we live in, economic activities are a necessary aspect of human survival. Yet, such economic activities result in various impacts on the environment, for example – the release of pollutants into the environment degrades its ability to assimilate such pollution and is resulting in global warming and climate change. Economic activities inherently involve the direct or indirect exploitation of natural resources. Increased economic activity raises living standards, but also results in increased emissions of pollutants and use of natural resources. Thus, the price of economic activity can be steep because a healthy environment is equally essential to human existence.

In economics, the environment is viewed as a composite asset that provides a variety of services. It sustains our very existence but belongs to no one (i.e. it is a common good). It has many uses, but can be poisoned by a single pollutant. As with other assets, we need to aim for the prevention of undue depreciation of this asset's value so that it may continue to provide life sustaining and aesthetic services for the foreseeable future.

The environment provides the economy with raw materials, which are transformed into consumer products by production processes using fuels (wood, oil, gas, etc.) drawn from the natural environment.

But exploitation of the natural environment creates many environmental problems, including overuse of renewable resources and degradation of the environment. Overuse of renewable resources and production of excessive waste destroy the economic value of the environmental asset. Overuse depletes renewable resources to the point that they are no longer available for economic use and pollutants can exceed the absorptive capacity of nature poisoning the air, water and land.

Numerous environmental services will be impacted by the business-as-usual scenario because this scenario will potentially destroy approximately 7.7 million ha of primary forests (based on spatial projections for the year 2020). This will result in the loss of both indirect values (i.e. carbon stocks, biodiversity, soil and water values), and non-use values (which consists of option values and existence values to the natural resources users). These values could amount to around $US 721 million and $US 67.5 million respectively. These calculations have employed the benefits transfer approach to demonstrate that there are environmental costs borne from forest exploitation.

This Total Economic Value (TEV) approach is an ideal approach whereby the marketed and non-marketed goods and services were taken into consideration using a universal unit of measurement. The concept of TEV seeks to render this type of valuation and comparison by incorporating numerous categories of tangible and intangible values. Unfortunately, putting such concepts into practice is proving extremely difficult, at best, and a seemingly impossible challenge, in the worst case. Arguably, economists have yet to develop widely accepted and believable practices for quantitatively analysing important non-market/intangible goods and services – this work is no exception.

6.2 Sustainable Development Scenario

6.2.1 Transport and access

Rather than prioritizing road developments, a more sustainable development option includes the following:

- Expand and improve air, river and sea transport to provide access to populated isolated areas, particularly in the highland regions, and to ensure that health and education service are provided to these areas.
- Maintain existing roads

Economic consequences
According to Papua's current budget, $35.4 million has been allocated for airport improvements and $19.2 million has been allocated for port (sea and river improvements). Another $40.3 million could be re-directed from the budget allocated for road extensions to air, sea and river transport improvements. Less money would be required to maintain an expanded road network in the future and funds could instead by spent on ensuring that existing road networks are well maintained and used by the larger community.

Environmental consequences
Air, river and sea transport improvements have less impact on the environment than road developments. As mentioned above, road developments tend to result in deforestation within a 5 km radius of the road and open up forested land to other forms of encroachment. Roads are also often built by companies who have a vested interest in gaining access to timber resources.

Expansion of airports only has a minimal impact on the environment as land is used to expand runways and river and sea transport usually makes use of existing canals and rivers. Care is nevertheless needed to make sure that oil leaks are minimised and that litter is not discarded into waterways.

Use of sea and river transport can also allow people to travel along the southern coastline with minimal environmental impact to peat and mangrove ecosystems.

Social consequences
Expansion of transportation networks is expected to have a positive impact overall for highland communities and other isolated communities as it will improve access to education and health facilities. However, care will be needed to ensure that improved transport options can be accessed by the poor and are affordable. There is a risk that an improvement of air transport will only allow the rich and the middle class to travel and gain access to health and education while the poor will be left in isolation. To ensure that this is not the case, air transport may need to be heavily subsidized by the government – however these costs would need to be weighed against the annual savings made in not having to maintain underutilised roads. In addition, it is important that the air transport system not be seen as only being developed for the transport of passengers, but also for the transport of goods, particularly the transport of high value-low volume cash crops from the interior (e.g. coffee, agar wood, etc.) thus making the link with improved livelihoods of farmers living in the interior.

6.2.2 Mining

The sustainable development option for Papua's mining sector does not differ significantly to what is already happening in Papua, however, it requires substantial changes to be made to the way in which revenue is distributed to enable mining to benefit the larger community.

The sustainable development option involves the development of a number of large-scale mines that have the potential to generate substantial revenue for Papua's governments. A limit should probably be established to ensure that mining does not dominate the economy and result in 'dutch disease', but there does seem to be scope and reason to expand large-scale mining in Papua as there are presently only

two large-scale mining projects (BP and Freeport) and only one of these is located in Papua province.

The large caveat for this option is that substantial effort is required to ensure that: 1) the environmental consequences of large-scale mining are well managed, mitigated and regulated; and 2) revenue generated from large-scale mining is transparent and used to alleviate poverty, provide health and education services, support sustainable development and promote good governance. This is a tall order that will not be easy to deliver and substantial assistance will be required to ensure it can be delivered.

Economic consequences
If another few mines can be developed on a scale such as Freeport and BP, substantial revenue can be generated for the Papuan government, district governments and the central government. If a transparent and equitable governance structure can be established in Papua it is possible that these funds can be redirected into developing needed public infrastructure (electricity, telecommunication etc), providing and improving health and education services, improving and expanding airport and sea transport to enhance access to isolated regions.

Environmental consequences
Large scale mining does have a number of environmental consequences. It can lead to deforestation and most significantly, result in mine tailings that damage watershed and down-stream ecosystems. The good news is that these environmental consequences can be mitigated if good management is put in place and the mine operations are well regulated and controlled. Most international mines now have environmental departments that seek to minimise the impact of large scale mining, partly as a result of increased international attention being paid to the environmental impacts of mining activities. In addition, substantial technical advances have been made to ensure that mine tailings have a limited impact on the environment. The Papuan government would need to ensure that best management practice for mines is applied in Papua if it were to explore this option further.

Social consequences
If revenue generated from mining can be more equitably distributed and allocated into public infrastructure projects, health, education and sustainable transport improvements, large scale mining could have a positive social impact for the broader community in Papua. However, much care will be needed to ensure that the communities directly impacted by the mining operations are well consulted, compensated and cared for. Considerable assistance will also be required to mitigate the numerous social impacts arising from mine developments such as an increase in sexually transmitted disease, mercury poisoning, conflict, disempowerment and marginalisation resulting from an increased number of migrants brought into man the mine. This is again, a tall order, and considerable assistance will be required to ensure that the social consequences of mining outweigh the negative consequences that have been noted to date.

6.2.3 Forestry

The sustainable development option involves scaling back large-scale logging and replacing it with community based small-scale logging that is sustainably managed

and well-regulated. It also potentially involves re-allocating for carbon storage some of Papua's conversion forests and protection/conservation forests allocated for exploratory mining. Moreover, best practice methods (i.e. RSPO, HCVF, certification) should also be used and applied for oil palm developments, logging operations and spatial plans.

Economic consequences

If sustainable small-scale logging could effectively be implemented and regulated to ensure that it is sustainably managed, it is likely that customary communities will benefit from the exploitation of Papua's forest resources rather than large-scale corporations. Provincial and district governments are also likely to be able to generate more revenue if they are able to issue forest use permits and to regulate Papua's forests for sustainable logging.

However, great care will be needed to ensure that revenue generated from the exploitation of Papua's forest resources is transparently managed and redirected into sustainable development projects that seek to alleviate poverty and improve public infrastructure, health and education. Great care will also be needed to ensure that wide-spread corruption does not spread to the local level and allow a select powerful local elite to benefit from small-scale logging while the majority continue to be denied access to forest resources or unable to profit from forest exploitation. Best practice methods, such as those outlines in the RSPO criteria and the certification guidelines can be applied to mitigate these undesirable impacts.

The allocation of conversion forests for carbon storage can also potentially result in economic advantages if the Papuan provincial government is able to demonstrate that it can protect these forests from encroachment. This activity can potentially allow the Papuan government to become eligible for performance based carbon payments, which will allow the government to generate revenue from the protection of these forests. At this stage, however, carbon based performance payments are not thought to be competitive with other profitable land uses, such as oil palm, so some economic trade-offs may need to occur unless the carbon market can become more competitive in the near future.

Environmental consequences

It is possible that well-regulated small-scale logging will result in sustainable management of Papua's forest resources. However, great care and assistance will be needed to ensure that small-scale logging operations are well managed and do not result in clear-cutting or unsustainable logging (as has occurred in the past). Small-scale concessions will need to be allocated in a transparent manner and in accordance with good spatial planning that is based on up-to-date and accurate spatial data. Logging operations within these concessions will also need to be well regulated to ensure that logging does not occur, for instance, on steep slopes, within conservation areas, or outside concession boundaries. This may require a considerable investment in Papua's forestry office as staff will need to acquire the necessary skills and knowledge to manage and regulate small-scale logging concessions. It is possible that community institutions can be established to help monitor and regulate these concessions and help to ensure that they do not result in clear-cutting or wide-spread deforestation.

The allocation of substantial areas of conversion forest for carbon storage will undoubtedly have considerable environmental benefits. These forests can help to mitigate global warming, protect biodiversity, protect watersheds and mitigate soil erosion.

Social consequences
Small-scale community based logging is expected to be able to benefit customary communities who have long been denied access to forest resources and have watched their forests be plundered for the economic gain of others. Care will still be needed to ensure that locally based corruption and intimidation does not occur so that small scale logging is able to benefit the majority rather than a select local elite.

Performance based carbon payments can also benefit local communities and local governments provided that an effective and transparent payment mechanism is development to ensure that these payments can be utilized for the common good rather than to line the pockets of a select few. Considerable thought and effort will be required to ensure this will be the case and it will be a priority of international efforts to ready Indonesian for eligibility for carbon payments in the near future.

6.2.4 Mamberamo

The sustainable development option will greatly rely on good spatial planning that will determine optimum areas for oil palm developments (based on the RSPO criteria and factoring in HCVF analysis), promote sustainable agriculture that is culturally appropriate (such as sago development), prioritise road developments that link up the most populated areas in the region and do not tear apart the Mamberamo forested region (i.e. focus on linking up towns and cities on the coast) and potentially allow for the development of one or two mining developments that have the potential to bring in significant revenue for Papuan governments.

Economic consequences
Economically, this scenario is only likely to generate more revenue that the business as usual scenario if performance based carbon payments can become a viable option for Mamberamo's lowland forests and if these payments can be competitive with other land-uses, such as oil palm. Revenue can, nevertheless, be generated from developing well managed community logging operations, oil palm plantations that meet the RSPO criteria and mining operations that mitigate tailings and other environmental impacts.

Environmental consequences
If development in the Mamberamo region can primarily be focused on the coastal areas and be directed in such a way that it can protect the majority of Mamberamo's lowland forests, substantial environmental benefits can be gained from carbon storage, biodiversity protection and watershed protection. Moreover, the Mamberamo region will continue to be globally recognised as one of the last remaining intact lowland forests in the world.

Social consequences
Scaled back development that focuses on conserving Mamberamo's lowland forests can potentially benefit local communities if performance based carbon payments can be awarded to Papua's government and redistributed to local people in the region to

reward them for conserving these important forests. It can also help to ensure that customary communities are not marginalised by migrants bought in to man large industrial developments that may potentially be established in the area to utilize electricity generated from the mega-dam project.

However, on the other hand, if performance based carbon payments can not be effectively channelled to benefit local communities in the area, there will be little scope for developing this region and ensuring that adequate services are generated to alleviate poverty and provide satisfactory health and education services.

If this is the case, one or two large-scale mining developments that are well regulated and managed to offset substantial environmental consequences in the Mamberamo region may be able to generate sufficient revenue and employment for the region.

6.2.5 Economic impacts of the sustainable development scenario

For the sustainable development scenario, the GDRP growth is assumed to be around 4% until the year 2020 where the economic development is implemented in the more environmentally friendly manner without rapid exploitation of natural resources. This will result in a GDRP of approximately $US 4,353 million in 2020. However, it is worth noting that this estimation could be altered significantly by the recent emergence of a carbon market for reducing emissions from deforestation and forest degradation.

The sustainable development scenario could provide approximately $US 1,704 of per capita income to the Papuan people in 2020 without the consideration of the other benefits of the remaining environmental services of the forests based on the TEV approach mentioned earlier. Taking into account the forest goods and services of the province would give per capita income as high as $US 3,491 in 2020. This estimation took into account all marketed and non-marketed goods and services of the remaining forest areas that are projected to exist in the 31 million ha of forest.

6.2.6 Social impacts of the sustainable development scenario

Because the sustainable development scenario will result in less deforestation and forest degradation the Papuan people will be able to profit and benefit from the environmental benefits that forests provide (clean water, carbon stores, biodiversity, non-timber forest products, timber for shelter, food, medicines etc). These benefits could be worth around $US 1,384 million in 2020.

6.2.7 Environmental impacts of the sustainable development scenario

This scenario, in its nature will result in minimal environmental impacts and it could potentially derive the most intangible benefits of the environment. The estimated indirect and non-use value for this scenario are $US 3,305 million and $US 215 million respectively.

6.3 A comparison of the BAU and the sustainable development scenario

Comparison of direct benefits reveals only a partial picture of how local and public welfare is likely to change depending on land use decisions in the areas studied.

The value and significance of a land use practice is tied to more than monetary financial returns that are modeled for this study in a simple way. For example, natural forests support the production of tangible goods, such as non-timber forest products, and facilitate some cultural practices and values that are primarily or completely intangible. Non-market and intangible benefits are also considered quantitatively in this study, they are contrasted with the type of direct financial/economic net benefits that are often used, for better or worse, as a conventional basis for land use decisions.

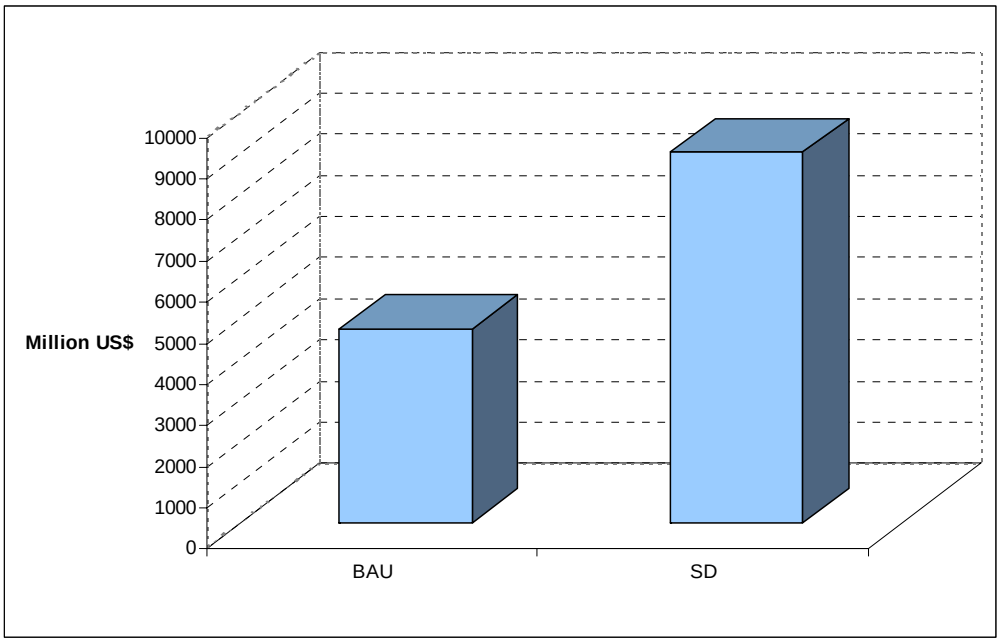
6.3.1 A comparison of the economic impacts

The business-as-usual scenario – especially for transport and access, and for mining – requires the least changes in institutional set-up and funding flows, as they do not question the way decisions are made, nor require major changes in the way decisions are made at present, nor do they require changes in the way funds are allocated. However the business-as-usual scenarios are also based on the assumption that sufficient funds will be available when, even in normal years, this is rarely the case with funds arriving late as well as being insufficient to fund, for example, even the maintenance of the existing roads network. Implementation of the business as usual scenarios may contribute, for a short-time, towards opening up the province to motorised traffic, increasing the mining revenues paid to central government and increasing the off-take from Papua's forests. However these will be short-term gains. Major road developments have been shown to "go hand in hand with" environmental degradation and forest loss within road corridors – moreover funds and capacity for roads maintenance on long stretches of road, in what is essentially an under-populated area will not be available unless traffic volumes justify appropriate maintenance levels. This is unlikely to be the case. Once the forest resources have been stripped, the traffic volumes will decrease leaving unmaintainable stretches of roads. Exploitation of mineral resources under the business-as-usual scenario is weighted in central governments favour. Although increased exploitation of minerals will have a certain economic spin-off for the Province, this pales in comparison with the revenues and taxes earned by central government.

The sustainable development scenarios proposed will cost less, will be easier to maintain and will be more sustainable also in financial terms. This would, in particular, be the case for the transport and access scenarios but also for the other three. The sustainable development option for the forestry sector – community-based logging – will maintain forest cover and forest species diversity, while ensuring that off-take of forest products is sustainable over time. No major additional expansion is required in the mining sector as even a minimal change in the distribution of existing revenues will dramatically increase the flow of revenues to Papua. This also implies that no major developments are needed in the Mamberamo, as sufficient resources can be made available to Papua through existing channels.

Based on the above, the team has attempted to compare the economic impacts of the two different scenarios. For this analysis, two parameters were utilized—corrected GDRP and per capita income. The corrected GDRP as mentioned above is the conventional GDRP plus the social and environmental benefits/costs.

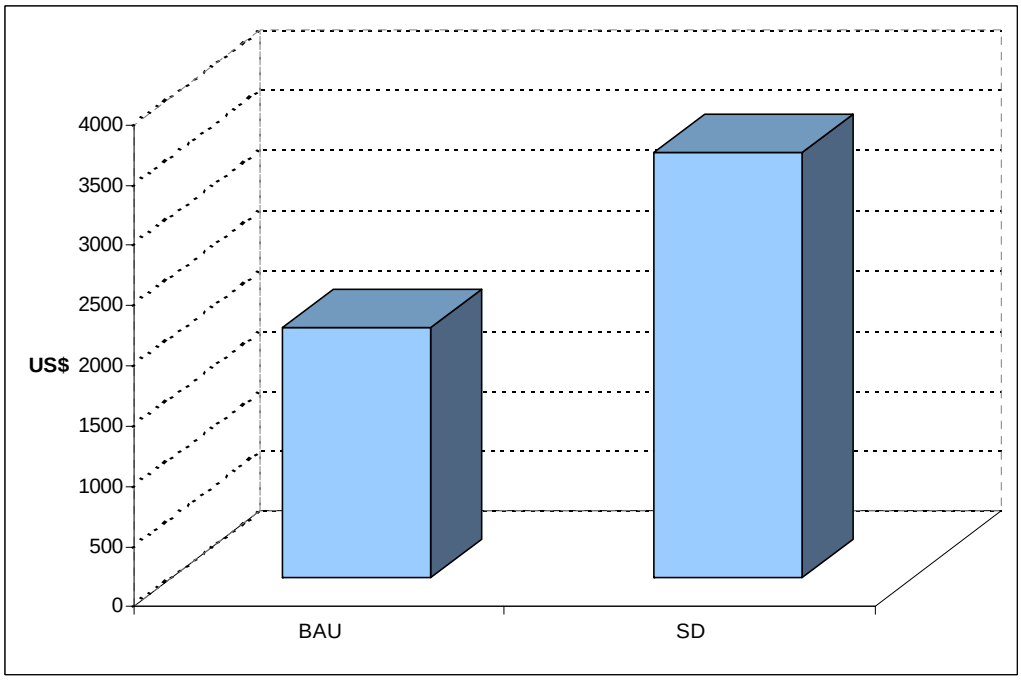
Figure 6.4. Comparison of corrected GDRP.



Based on these calculations, the sustainable development scenario GDRP is expected to be almost double in 2020 as most of the pristine forests are kept intact and these forests can provide significant tangible and intangible benefits to the society (i.e. clean water, carbon sinks, biodiversity habitats, etc as part of the TEV). The projected GDRP for this scenario was estimated to be $US 8,921 million.

On the other hand, the business-as-usual scenario is expected to result in the loss of most of these benefits because it will result in extensive deforestation and degradation. This situation will potentially result in a projected GDRP of $US 4,661 million in the year 2020.

Figure 6.5. Per capita income



A similar condition is also shown for the per capita income parameter, where the sustainable development scenario figured twice as high as the business-as-usual scenario, estimated to be $US 1,654 and $US 3,491 respectively.

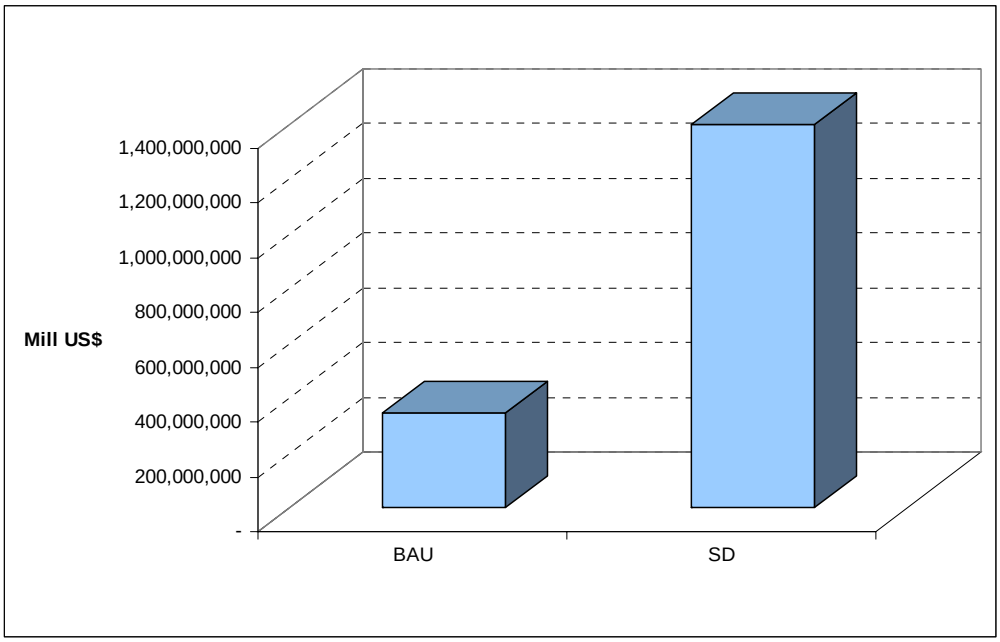
6.3.2 A comparison of the social impacts

The business-as-usual scenario is likely to result in increased migration out of the highlands to the coasts, increased marginalisation of indigenous populations living in the interior and continued difficult access to social services. Exclusion of communities living around new mining developments and impacts on livelihoods through haphazard disposal of mining waste – and in many cases, forced migration away from areas being opened up for mineral extraction – this would also be the case with the construction of large-scale damming of the Mamberamo to supply hydro-power for mineral extraction. Stripping of the forest resource by large-scale logging operations controlled by externally-based companies will contribute to exclusion of local communities.

The advantages of the sustainable development scenario is that people can stay living where they are --- and improvements in services and livelihoods will be supported. Social fabric will be held together, the impacts of HIV/AIDS, prostitution and alcoholism will be mitigated. Indigenous culture will be supported.

Moreover, there is a stark different in the social impacts of both scenarios if we consider the values of the remaining forests estimated to exist in 2020 based on the projections of the business-as-usual scenario and the sustainable development scenario. These projections are based on the spatial modeling provided by the team and are estimated to be in the order of 17.4 million ha for the business-as-usual scenario and 23.5 million ha for the sustainable development scenario.

Figure 6.6. Social impact



The sustainable development scenario benefits (thought to be in the order of US$1,384) are estimated to be up to 400% higher than the benefits derived from the

business-as-usual scenario in 2020 (thought to be in the order of $US 343 million). This is because most of the forest benefits in the later scenario would be destroyed in order to gain higher economic growth in terms of financial income rather than economic welfare.

Again, these figures are derived from calculations of the benefits forgone from the loss of healthy forest resources (i.e. clean water, carbon stores, biodiversity, non-timber forest products, timber for shelter, food, medicines, etc).

6.3.3 A comparison of environmental impacts

The business-as-usual scenario will carry with it long term environmental degradation and habitat loss. This will result in massive forest loss, an increase of CO_2 emissions and loss of biodiversity. Replacement and conversion of large areas of forest to oil palm will also have a string of negative environmental impacts – notably increased CO_2 emissions, and loss of habitat and biodiversity.

In contrast, the sustainable development scenarios leave the least damaging environmental footprint while harmonising more with indigenous culture and maintenance of sustainable livelihoods. Sustainable development scenarios also open up the possibility of putting Papua on the cutting edge of the global debate on the development of best practices both in forestry and biodiversity (REDD, RSPO, HCVF, certification) as well as in environmentally responsible management of mining ventures (treatment and disposal of waste; improved extraction methods; etc.)

Figure 6.7. Comparison of indirect value

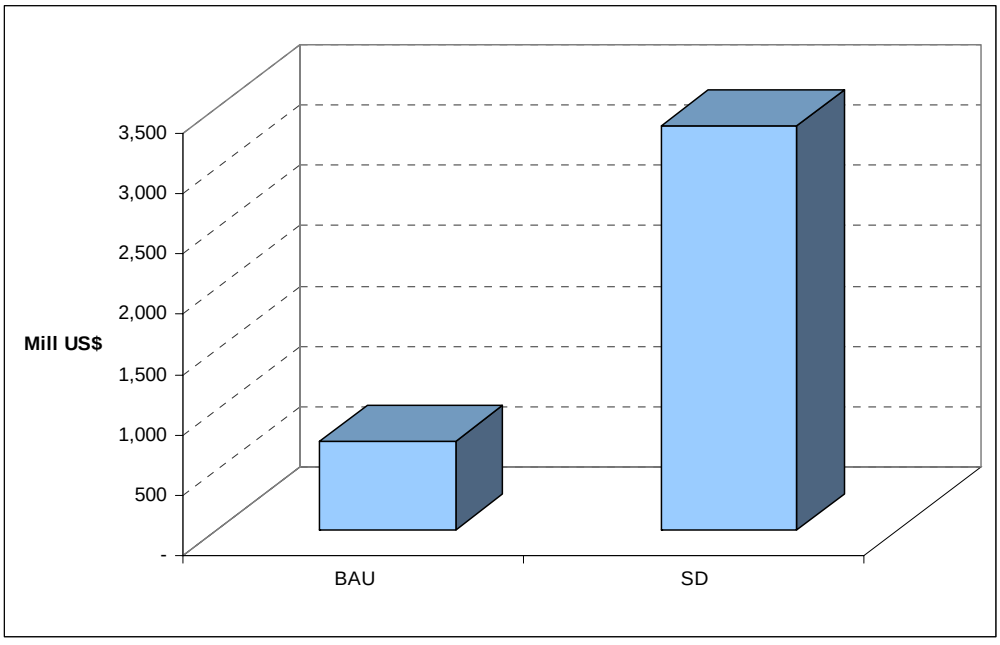
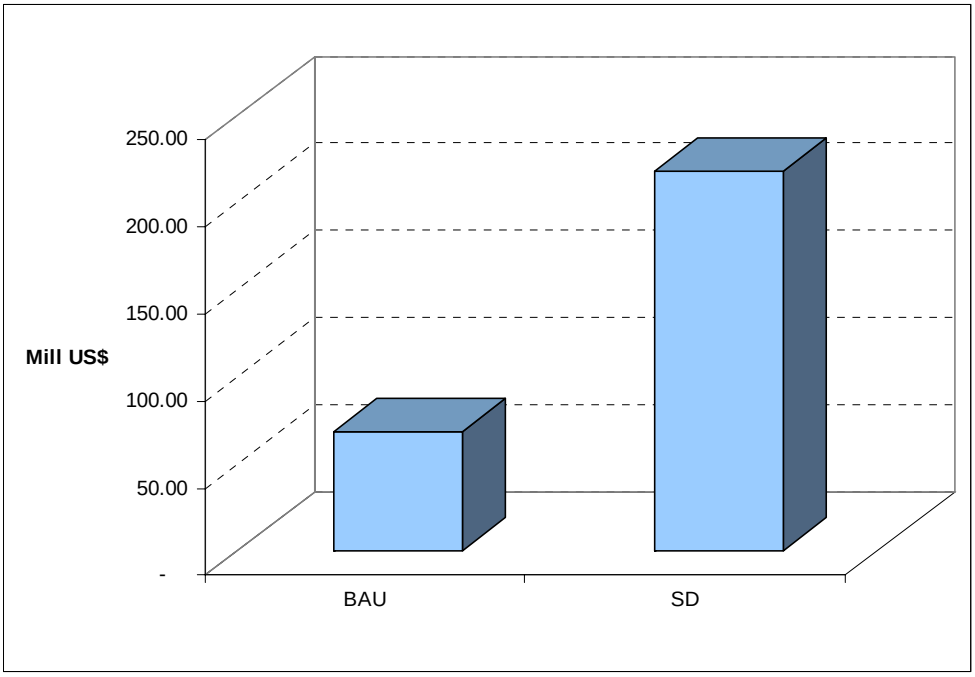


Figure 6.8. Comparison of non-use value



From an economic perspective, the sustainable development scenario potentially offers greater benefits. The indirect use value of this scenario (estimated to be US$3,305) is potentially 5 times higher that figure to be US$ 3,305 million than the other scenario (estimated to be in the order of US$ 721 million). This situation is also similar to the non-use value where the sustainable development scenario (estimated to be US$ 215 million), is 3 times higher than the business-as usual scenario (estimated to be in the order of US$ 67 million) for the year 2020[8].

This clearly demonstrates the obvious—that the sustainable development scenario will result in less environmental impacts than the business-as-usual scenario.

6.4 Summary

The assessment of the four sustainable development scenarios presented in this chapter should be seen as a major step in advancing the debate on implementing sustainable development options within the context of Papua's spatial development.

These scenarios are based on a scoping exercise carried out by the SEKALA, PCSSF and Nordic team, and the translation of development options into four preferred scenarios for the future – weighed against the business-as-usual scenarios.

The four sustainable development options proposed show that viable alternatives to the business-as-usual options can be developed which can put Papua in a win-win

[8] As described in the earlier section, the environmental impacts are derived from estimates of the indirect use values (that consists of soil and water conservation, carbon sink, flood protection, water transportation and biodiversity) and non-use values (option values and existence values of the goods and services of the users) of the Papua's forest resources. In this case the benefits will be derived from the remaining forest resources estimated to exist in both the business-as-usual scenario and the sustainable development scenario.

situation. The options proposed have attempted to combine poverty alleviation with sustainable environmental options, while, at the same time, contributing to reducing Papua's carbon emissions.

The transport and access scenario shifts the focus away from large-scale infrastructure projects with a sectoral focus (road construction, large airports in non-strategic locations, etc.) towards a focus which takes as its point of departure the transport and access needs of isolated populations (both people and goods). Economic consequences of this scenario would include lower capital requirements for both investment as well as for maintenance. The environmental impact will also leave a smaller footprint while the social impact focuses on maximum improvement for the improved accessibility of the highlands, and communities living in the interior.

The mining scenario – under a sustainable development option – is based on the point of departure that mining should not dominate the economy of Papua – especially in relation to the dangers of a "Dutch disease" situation. And that with increased revenue from existing mining operations, already a large contribution to Papua's economy can be made. A large expansion of mining activities, by contrast, is more likely to be of direct benefit to Central Government rather than to Provincial Government. Placing limits on mining will have positive environmental consequences, as will the improvements in the treatment of mining waste based on technical improvements and best management practices. The social challenge here is to ensure an improved repartition of mining revenues to infrastructure projects, health, education and sustainable transport options

The forestry scenario proposed involves scaling back on large scale logging and replacing this with community-based small-scale logging, sustainably managed and well-regulated. This would include allocating large swathes of forest for carbon storage. The challenge will be to ensure that the revenue generated is transparently managed and redirected to sustainable development projects. As regards to small-scale logging, it is also important that small-scale logging operations are allocated in a transparent manner and in accordance with good spatial planning. This will require capacity building of Papua Forestry staff. Community-based small scale logging is the scenario that impacts most positively on customary communities while ensuring long-term sustainability of the resource. An additional challenge is to ensure that performance-based carbon payments can also benefit local communities and local governments. The scenario will focus on best-practice methods (i.e. RSPO, HCVF, certification) to be applied to oil palm developments, logging operations and spatial plans.

The Mamberamo scenario focuses on the importance of maintaining this area as an important and unique area with an environmental importance not just at a provincial level, but also at a global level. The challenge will be to prioritize development that ensures sustainable agriculture, which allows access while not tearing apart the forested region. The challenge here will be to develop carbon payments as viable options which can be competitive with other land uses (such as oil palm). This approach will have the least environmental consequences as well as having the most positive spin-off for local indigenous communities. The scenario includes prioritizing minimum impact road developments and possibly allowing a few well-regulated and managed mining operations.

With all four scenarios, the challenge will be to arrive at spatial development scenarios which maximize the benefits for Papua province. These choices are not necessarily the scenarios which might bring maximum financial benefit to central government – nevertheless they are scenarios which are seen as being win-win-win solutions for Papua.

7. CONCLUSIONS AND RECOMMENDATIONS

This study has taken place at a crucial point in time for Papua province. Put within the context of the debate on climate change, the results of the United Nations Forum on Climate Change, held in Bali in December 2007 and the international attention for the environment and threats to biodiversity, Papua Province is in the unique position of being able to make a major difference – either positively or negatively. Over 90% of Papua's land area, for example, is still covered by forests. Depletion of forest cover will release CO_2 emissions – using forests for carbon storage and sustainable logging does the opposite.

The second challenge for Papua is to address the issues of the extremely high incidence of poverty – especially amongst indigenous Papuans – taken within a context of decades of high economic growth. These high growth rates have not translated themselves into poverty alleviation. There is still a long way to go to reach the Millennium Development Goals.

The objective of this assessment is to assist in developing ways forward which can be seen as win-win situations for both the environment and for poverty alleviation. This is possible.

The strategic assessment has been about trying to arrive at poverty-environment trade-offs which show that by focusing on sustainable use of the environment there is more of a positive spin-off on poverty than by developing, for example, large scale extractive (e.g. minerals) and plantation (e.g. oil palm) industries. Therefore it is not so much a question about focussing on the environment in Papua because the rest of the world says so; but because it makes sense for Papua and the Papuans to do so.

The strategic assessment has tried to move away from looking at development scenarios with sectoral blinkers, or to look at development as only an issue for the public sector. Instead the focus is more spatial and tries to look at priorities within a spatial context – particularly at the Cordilla range, the Mamberamo and the Southern swamps and Transfly. West Papua has not been included in this assessment and similar work needs to be done there, also in the context of the marine environment and proposed oil and gas investments.

Within these settings a number of development scenarios have been developed which will need to become the basis for discussion and decision-making with stakeholders. This is the key to the strategic assessment methodology, that the development of scenarios, and the decision-making on these, is part of an inclusive process between planners, decision-makers and other stakeholders (including civil society).

The future of Papua's forests depends on the development path Papua decides to pursue. For example, if Papua chooses extensive road development then there is a risk that forest cover may be significantly reduced and a number of conservation areas will be threatened by encroachment. Viable alternative development options can conserve large forest areas while still meeting development goals. Revenues obtained from mining and gas industries could allow Papua to pursue alternative

development options that result in minimal deforestation. Spatial modelling techniques can help to identify forest areas that can be conserved for biodiversity or carbon storage, and forest areas that are most suitable other land uses such as oil palm and industrial timber plantations.

The risk with road development is that large sums of money can be spent on road construction without this having a beneficial effect on poverty levels and on improving living standards. Instead the assessment has chosen to approach the issue from an access and a spatial viewpoint rather than from a preconceived notion that without roads no solutions are possible. If access (rather than roads) is taken as point of departure, then this opens up for a discussion on air, road and water transport – making use of the existing network of ports and airstrips (and improving these and expanding the network).

This is particularly the case for the Central Highlands where there are high population densities. Recommendations here would include: a focus on expansion of air services (including expansion of Wamena air port and improvement of air strips at Mulia and Dekai), improvement of the river transport and port handling facilities at Dekai, and development of marketing chains and processing facilities for tree-based cash crops (coffee, cocoa), as well as non-forest timber products. In addition, this would involve developing the value chain for eco-tourism. This scenario is probably the least cost scenario for access; linked to this would be the development of educational facilities (boarding schools) in growth hubs.

This kind of thinking outside the box also opens the way for public-private partnerships; and for public sector/non-government sector partnerships. Improved access in this context means expanding IT and broad-band coverage to as many parts of the Province as possible. The broadband brings schools and health centers closer to the supervisory level and allows for better communications between institutions and between individuals; and the cell phone has proved to be the poor man's preferred system of communication as well as encouraging literacy through the use of the cheap SMS function. Cell-phone banking and cell-phone money transfers bring the cash economy closer – and allowing the private and the informal sector to run this lowers transaction costs for all users. All forms of marketing are supported by better communication.

Similar points of departure have been taken for the other three development scenarios: the Mining scenario; the Forestry scenario; and the Mamberamo scenario.

In the mining sector, mining operations, especially those which threaten conservation or protection areas, or which are seen as having a negative effect on climate change, will find their every move the subject of scrutiny and censure, both nationally as well as internationally. Therefore all mining venture will need to take as point of departure their potential repercussions on poverty-environment win-win situations. To this is added the challenge of trying to translate Papua's minerals-derived high economic growth levels into sustainable poverty alleviation (through more equitable sharing of the taxes, royalties and profits).

In the forestry sector it is important that development scenarios link up with international best practices being developed (both within production forestry but also,

where relevant, as sustainable palm oil production, etc.) and that Papua is proactive internationally in developing or utilizing such best practices for the development of the Province and its peoples. Thus funding provided for environmental interventions (or non-interventions in the case of non-conversion to palm oil), also needs to reach ordinary Papuans. Exploring ideas on carbon storage need to be linked to a channeling of such financial resources to those who manage the forest resources. Here – as with mining - international pressure (environmental lobbies, civil society, corporate social responsibility, etc.) can be mobilized to ensure that the livelihoods approach remains the centerpiece of the environmental, sustainable development and climate change debate.

Finally, as regards the Mamberamo, the value of this area as a unique area of major global importance for biodiversity, suggests that this area needs to be conserved, based on poverty alleviation agendas for the indigenous communities living in the area, linking with local communities and local governments developing, monitoring and enforcing management plans.

Suggestions and recommendations have been made for each of these scenarios; however all will need more detailed planning and increased involvement of stakeholders closer to the level of implementation.

Therefore, it is recommended that each development scenario is further developed in consultation with decision-makers and stakeholders in a series of workshops, using this report, and the maps prepared as part of this exercise, as the basis on which to initiate a decision-making process.

8. NEXT STEPS

8.1 Follow up assessment with multi-stakeholder workshops

The present assessment is being implemented under a lump-sum contract utilising a limited funding envelope provided by the World Bank. This contract has covered the initial mapping, field visits and assessment activities. It will also be able to cover a draft report and initial presentation of results at a single workshop. The SEA process, ideally, is a longer process which involves stake-holders (Government, non-government and civil society) in a discussion and decision-making process. There are insufficient funds available under the present financing to implement the several discussion steps linked to the various scenarios being presented – an issue which was already made clear to the World Bank at the time of initiating the strategic assessment.

If the strategic assessment is to follow through the decision-making process with the stake-holders, then more funds will need to be accessed.

8.2 Conduct similar assessment on West Papua

This assessment only focused on the Province of Papua and a similar assessment is needed for the province of West Papua. In addition to Forestry, the focus should be on marine and mining as these are both prominent there. Some of the spatial data and maps generated for the Papua strategic assessment do, however, cover the whole Indonesian part of the island of New Guinea, and could serve as a basis for an assessment of West Papua.

8.3 Provide assistance for spatial planning

This strategic environmental assessment was only able to provide baseline data. It has not resulted in a new spatial plan. Developing a new spatial plan needs time and quite a lot of consultation, both of which will be initiated in 2009. Ideally, the new spatial plan will include new land use categories, such as customary areas, community logging areas and carbon storage areas.

Papua is very large and it is very difficult to assess all of the many variables affecting spatial planning in a comprehensive way. While a range of integrated options need to be considered as a whole, intensive and detailed spatial planning should occur within the four geographical zones: Cordilla range, Mamberamo, Southern swamps and Transfly, and Birdshead.

These planning options need to take as point of departure the results of the stake-holder workshop and the decision-making process linked to the scenarios presented.

Below are some rough ideas about how a spatial planning process could be carried out in Papua. Some of these steps have already been undertaken for this assessment so a start has already been made.

1) Review current spatial plan. The most recent spatial plan was undertaken by Universitas Hasanudin. While this spatial plan included important spatial information, improvements still need to be made.
2) Review policies and regulations on licensing of concessions to mining, logging and plantation companies to determine how concessions are allocated, how they can be reviewed and how they should potentially be allocated in the future.
3) Collect available spatial data on logging concession boundaries, mining concessions, oil palm concessions, forest zone categories (production, conversion, conservation and protection forest), rainfall, topography, soil types (peat, mineral etc), population, roads and airports, etc. This data is scattered all over the place and it is quite a big task to gather the most recent data together.
4) Improve spatial data. Considerable effort may be required here. Many of the legal concession boundaries only exist on paper maps. These maps need to be digitized and adjusted into Indonesia's new national basemap so that this data can be analyzed and assessed for spatial planning purposes.
5) Hold consultations to assess stakeholder development aspirations, ideas about spatial planning. To ensure that different stakeholder aspirations are considered in the spatial planning process.
6) Provide spatial planning scenarios based on consultations.
7) Hold consultations on the spatial planning development scenarios and try to build up consensus among different stakeholders about a spatial planning scenario.
8) Draw up a detailed spatial plan and hold lots of consultations on it to secure commitment and buy-in.

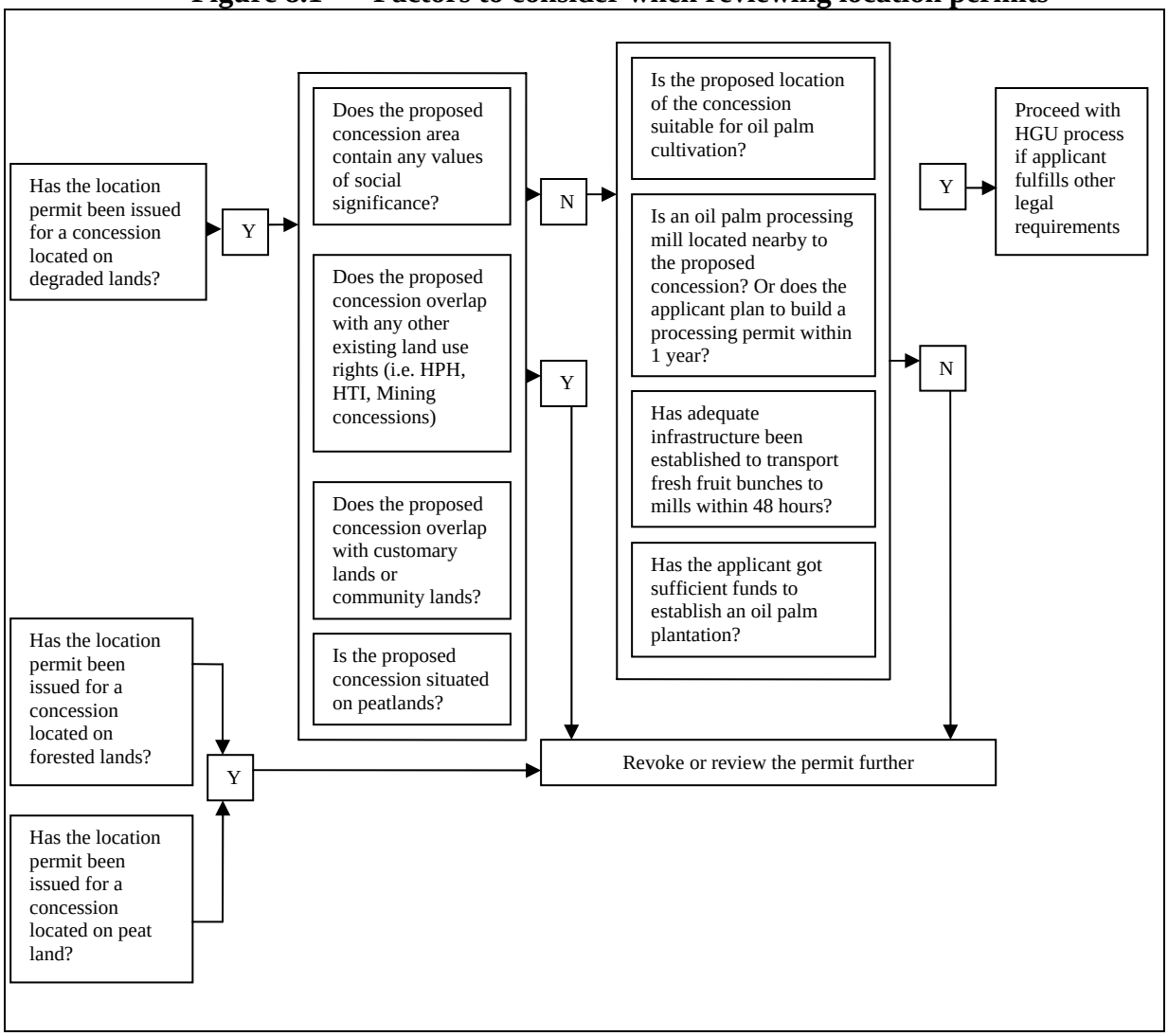
The implementation of the spatial plan will need to be followed up with monitoring and evaluation. It's also possible that the spatial plan will need to be regularly reviewed, however it would be useful to have a good starting point that can be modified and adapted.

Other activities that will probably need to be undertaken as part of the spatial planning process in Papua and will need a lot of support are:

- Identifying new spatial categories, such as community forests, customary forests/zones and spiritual sites etc. A lot of dialogue is needed to undertake this and investment in community mapping is required.
- Reviewing large-scale logging concessions and finding ways for community logging to work (this is a priority of the Papua provincial government). Focus should initially be on identifying logging concessions that are idle.
- Reviewing location permits already issued to oil palm companies. In Indonesia, more land than is necessary has already been allocated to oil palm companies. Land has been allocated in an ad hoc manner without proper planning or consideration for critical factors, such as rainfall, soil suitability and land cover. This occurs because many companies find it easier to acquire land clearing permits for oil palm plantations than logging permits. The central government is encouraging oil palm development in Papua and is allowing companies to get large land holdings of up to 200,000 ha. In other provinces they are only allowed to acquire 100,000 ha. Papua is one of the few places

companies can now turn to in order to get access to good quality timber. A lot of permits have already been allocated to oil palm companies without giving consideration to good planning, quotas, demand and land suitability. Figure 1 provides some factors to be considered when reviewing location permits. Political will is a necessity for this process as many companies have probably already paid up to $400,000 to acquire a location permit so they are not going to be too happy about having these permits reviewed. They can potentially be offered alternative lands that are not forested, are not peatlands and are suitable for oil palm developments.

Figure 8.1 Factors to consider when reviewing location permits



Source: Casson et al. 2007.

- Possibly setting guidelines/limits on oil palm expansion, logging and mining. The same may also be necessary for forest zone categories, such as conversion forest, conservation forest etc.

8.4 Facilitate multi-stakeholder consultations and political buy in

The key to making spatial planning successful and useful is consultation and buy-in. If one has lots of consultation and secure buy-in from multiple stakeholders there is

more of a chance of mitigating corruption—i.e. companies being able to pay off officials for securing land rights, altering boundaries and changing spatial plans. The more people that know about a spatial plan the harder it is for corruption to continue. So the key to this is transparency and consultation. Stakeholders need to feel like they were consulted about a spatial plan and had some say in its development. They also need to be able to easily access the spatial plan and to be well informed about its outcomes.

One also needs political will to ensure that government planners adhere to the spatial plan. In Bali, for instance, government officials do not adhere to spatial plans and issue land to villa developments when it has been categorized for conservation or watershed management. They also issue land far too close to the beach in violation of many laws. Another problem in Bali is that different government departments have different spatial plans and maps. So an area might be classified as a 'green belt' on one map, but not on another map. Until recently, government officials could always be paid off to change the land status determined on the map; however, a change of government has made this more difficult now. In Bali, therefore, it is political will that may have a chance of improving ad hoc development. The same is probably also true for Papua.

Accountability is also an important factor. Government officials need to be held accountable for the decisions they make, and if they issue permits for developments in areas zoned for conservation they need to be held accountable for it.

Finally, a spatial plan needs to be economically attractive and able to deliver economic benefits and development options.

8.5 Engage district governments in spatial planning process

This process was not able to adequately engage district governments and there is a great need to do this through workshops, focus group discussions and consultations. This is particularly important for districts that are facing development challenges posed by spatial planning. 90% of Pegunungan Bintang is designated for conservation and protection; 84% of Tolikara is currently designated for conservation and protection; and 78% of Yahukiumo district is designated for conservation and protection. In consultations we have had in the past, these districts have asked for help and said it is very difficult for them to generate income because most of their land area has been designated for conservation. Compromises might have to be found for these districts. The district of Asmat is also a special case because 85% of this district is peat soils and the provincial government currently plans to build a road straight threw this area.

8.6 Training

SEKALA was able to provide some GIS training during this assessment by linking up with WWF. However further training on spatial planning, remote sensing, GIS and community mapping is required to enable Papuan stakeholders to make informed spatial planning decisions and allow them to utilize technology to draw up new spatial plans.

8.7 Informing and Influencing Decision Making

The draft report with spatial scenarios and initial recommendations needs a process of Review/Decision making. This process is difficult to set in a rigid time-frame as it needs the involvement of stakeholders. The SEA team can no longer set the time frame, it can only facilitate the process.

Therefore there also needs to be sufficient time made available between the finalisation of the draft SEA report and the taking of decisions on the various scenarios to allow for public consultation, before the report is finalised.

8.8 Monitoring and Evaluation

During the finalization process, and linked to the decisions on which scenarios to start developing, it becomes important to set up information tracking systems within and outside provincial government. These will have to be designed for each scenario although, in many cases, these may be based on existing monitoring systems.

There will be a large range of actors involved in monitoring activities: provincial and national government; local government; non-government organizations (Global Forests and Trade Network; FSC, etc.); civil society.

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ANNEX 1. Activities Undertaken For This Study

The following activities were undertaken for this study between August 2007 and April 2008.

A1.1 Project mobilization

The team was mobilized shortly after the contract was signed on 28 August 2007. In the month of September, the team leader (Yohanes I Ketut Deddy Muliastra, SEKALA) liaised with the international SEA expert to develop a methodological approach to the SEA. The team leader also liaised with team members to develop a detailed work plan and ensured that all team members understood and agreed with the proposed approach and method. Each team member was assigned clear tasks and deliverables.

A1.2 Consult key stakeholders to initiate assessment

Shortly after the contract was signed the team leader, Ketut Deddy, visited Jayapura to inform key stakeholders about the Papua SEA and to seek their inputs into the process. The team leader also discussed the proposed timetable and the expectations of key stakeholders in Papua. During this time he met with a number of stakeholders including:

- Alex Rumaseb, The Head of Bappeda, Papua
- Agus Sumule, Special Advisor to the Governor of Papua.
- Marthen Kayoi, Head of the Provincial Forestry Office
- Noah Kapisa, Head of the Regional Office of the Forest Planning Agency (Badan Pengukuhan Kawasan Hutan).
- Benja Mambai, Director of WWF Papua office.
- PPMA, a local NGO.

These meetings were facilitated by PCSSF, our local partner in Papua.

A1.3 Baseline assessment

SEKALA set about collecting and reviewing available literature on Papua shortly after the contract was signed in late August 2007. This task has resulted in the accumulation of a vast resource of materials on Papua's development plans, spatial plans, natural resources, laws and regulations and government. This material has been reviewed by the team and was used to develop development scenarios and assess Papua's spatial plan.

A1.4 Undertake stakeholder assessment

PCSSF began to undertake a comprehensive stakeholder analysis in September 2007, under the leadership of Maria Latumahina. A questionnaire was developed to guide the stakeholder analysis and ensure that targeted questions were asked of key stakeholders (the stakeholder questionnaire can be found in Appendix 1). Over 40 stakeholders were interviewed. The stakeholder analysis sought to:

1) Identify and analyze various interest groups and their power to influence development in Papua;
2) Identify and analyze impacts on communities and groups that will benefit from different development scenarios;

3) Identify and analyze different levels of vulnerability to adverse development impacts and risks (focus is on indigenous Papuans and other vulnerable groups); and

The following stakeholders were targeted in the assessment.

Government	Private Sector	Civil Society	Others
Provincial Govt. BAPPEDA Transport Mining Forestry Enterprise dev. Health Education **Elected Reps.** The Governor Bupatis Parliamentarians MRP members Dewan Adat Papua **Jakarta-based govt.** President's office BAPPENAS Forestry **Military & Police**	Freeport BP Korindo Wapoga Papuan-owned	Women's groups Youth groups Churches Indigenous communities PCSSF FOKER Green Peace WWF Conservation Intl. PPMA	Political parties. Academics Media AusAID UNDP DFID World Bank

A1.5 Gather together necessary spatial data on Papua

During the course of the assessment, SEKALA improved its spatial database on Papua and acquired new spatial data on oil palm estates, mining concessions, logging concessions, timber estates and conservation areas. It also digitized data on Papua's peat and wetland areas and Papua's latest spatial plan. This data was analysed and used to develop different spatial development scenarios.

A1.6 Assessment of social priorities

From 24 Sept to 8 Oct 2007 our poverty specialist, Angel Manembu, undertook an assessment of Papua's social priorities. She consulted stakeholders in Jayapura and Asmat and set out to:

- Identify social priorities (such as cultural aspirations, improved health and education facilities that can reach isolated areas through developments such as roads and bridges, protection of sacred sites, and acknowledgement of traditional land rights).
- Together with other team members, develop a range of scenarios for spatial development with a set of different assumptions on development policies, growth and environmental quality; especially provide input on poverty alleviation opportunities and cultural preservation.

- Assess the effect of social priorities, such as social-rural/urban migration rate, change in number of people involuntarily resettled, change in area subject to traditional land tenure.
- Provide inputs for identifying percentage of population below the poverty line; change in income distribution; projected GDP per capita; change in government revenue
- Provide inputs into the stakeholder analysis which will identify the social development aspirations of different stakeholders.

A1.7 Participate in spatial planning and REDD meetings

From 2-8 October 2007, four team members (Ketut Deddy, Benja Mambai, Hidayat Al Hamid, Maria Latumahina) participated in two high level meetings held in Manokwari on spatial planning and reduced emissions from deforestation and forest degradation. These meetings provided an opportunity for the team to discuss Papua's development plans and spatial plans with local government officials, international and local NGOs and the private sector. It also allowed the team to consult with other organizations that are planning to assist Papua government with its spatial planning process (i.e. CI, WWF and IUCN). During this meeting, all of these parties decided that it was critical to work together to assist Papua with spatial planning.

A1.8 Training on GIS scenario building

SEKALA hosted several GIS training last year. The GIS internship programme participated from PTPPMA, Bappeda and BPKH of Papua province in August 2007 was aimed to share information on land use planning problem in Papua and to introduce GIS tools for spatial planning purposes. At 5 to 9 November 2007 SEKALA in collaboration with WWF conducted a training workshop on GIS and scenario building using Marxan software. This workshop was followed up with an internship at SEKALA's office from 12 to 24 November 2007. Participants from Jayawijaya's forestry and Bappeda offices participated in the internship. SEKALA would like to expand this training and internship programme and invite 'decision makers' to participate in an effort to introduce scenario building using GIS tools and to the discuss results and the consequences from the analysis. This is presently outside the scope of this assessment but it is a task that SEKALA would like to undertake in the future if further funding becomes available.

A1.9 Review Papua's new spatial plan

In 2006, Universitas Hasanudin (Makasar) was commissioned to design Papua's spatial plan. The spatial plan was required to accommodate Papua's development plans and to allocate areas for logging, mining and estate development. The Papua government asked SEKALA and its partners to review this spatial plan as part of the SEA and to suggest improvements as part of its scope of work. SEKALA digitized the spatial plan designed by Universitas Hasanudin and assessed it to provide suggestions and alternative scenarios for this strategic environmental assessment.

A1.10 Identify economic, environmental and social priorities

Based on the above tasks, the team identified a number of economic, environmental and social priorities. These priorities are outlined in further detail below in Section 5 and include:

Economic priorities

- Mining
- Logging
- Oil palm
- Industrial timber plantations
- Agriculture
- Roads
- Air and sea transport
- Fisheries
- Electricity
- Telecommunication
- Tourism

Social priorities

- Poverty alleviation
- Health
- Education
- Food security
- Sanitation
- Welfare and rights of indigenous people

Environmental priorities

- Global warming and climate change
- Deforestation
- Peat conservation
- Watershed management, particularly in Merauke district
- Marine conservation
- Terrestrial conservation management

A1.11 Undertake comprehensive interviews to determine scenario options

From 4th to 16th February 2008, several team members, including Ketut Deddy, Benja Mambai, Dolf Noppen and Maria Latumahina, undertook comprehensive interviews with several key stakeholders in Papua to a) verify the identified social, environmental and economic priorities of various stakeholders and b) to identify a range of spatial planning scenario options.

A1.12 Develop spatial atlas on Papua

SEKALA put together available spatial data on Papua to develop a spatial atlas that pictorially shows the location of existing and planned mining, logging, oil palm and industrial timber concessions; the location of peat lands; forest land use categories; population statistics; language zones; fishing zones; conservation areas and a range of other information. The atlas was used to discuss different develop scenarios and options with stakeholders.

A1.13 Identify development options

The environmental, social and economic experts brought together by the SEKALA/PCSSF/Nordic Alliance teamed up with SEKALA's GIS technicians to develop a range of options for spatial development with a set of different assumptions on development policies, growth and environmental quality. Critical factors considered for constructing options included:

- Business as usual (continuation of existing development policies).
- Poverty alleviation opportunities.
- Transport option.
- Revenue generating opportunities
- Land suitability analysis.
- Carbon storage and avoided deforestation options.
- Peatland conservation.

Some of these options have been visually portrayed in maps. This has allowed the team to easily explain the options to Papuan stakeholders and to obtain their inputs.

A1.14 Assess the effects of economic, environmental and social priorities

The SEA team assessed the cumulative and induced economic, environmental and social consequences of each option over a 5-10 year timeframe in relation to two scenarios—1) A business as usual scenario and 2) a sustainable development scenario. Both of these scenarios were assessed according to key indicators, such as:

- Economic—Percentage of population below the poverty line; change in income distribution; projected GDP per capita; change in government revenue.
- Environmental—change in natural forest cover; change in carbon emissions.
- Social-rural/urban migration rate—change in number of people involuntarily resettled; change in area subject to traditional land tenure.

A1.15 Collect, improve and adjust spatial data for analysis

SEKALA collected a range of spatial data from various sources, improved this data and adjusted it into Indonesia's new national base map. This data was analysed and assessed to provide a range of spatial development scenarios.

A1.16 Inter-sectoral coordination

Our Papuan partner, PCSSF worked with the core team to help the provincial government of Papua to organize inter-sectoral meetings with governmental and non-governmental stakeholders to discuss the priorities, options, scenarios, consequences and recommendations identified during this assignment. The meetings:

- obtained inputs for the identification of economic, environmental and social priorities
- obtained inputs on a range of scenarios for spatial development;
- obtained inputs on the effects of economic, environmental and social priorities.
- obtained inputs on the final results of the SEA.

A1.17 SEA training workshop

As an integral part of the report-back/decision-making workshop with stakeholders, SEKALA and PCSSF set the context for the discussion by including in the workshop an introduction to “what is an SEA” and how the different SEA steps have been implemented in the case of the present strategic assessment. The actual report-back/decision-making workshop forms an important step in the SEA process and it was decided that it made more sense to use the identification of the relevant scenarios for Papua as the basis for the discussions on the SEA process, rather than indulging in a theoretical exercise.

The materials used for the workshop (translated into Indonesian for the workshop) are included in Appendix A.3.

A1.18 Undertake economic analysis of the business-as-usual scenario and the sustainable development scenario

In early 2008, the team analysed the economic and social consequences of the business-as-usual scenario and the sustainable development scenario. This analysis was carried out with the use of simple calculations and projection formula. Thorough economic modelling was not possible because there is only limited economic data and information available in Papua province.

The economic calculations were primarily derived from secondary data drawn from provincial statistical publications (such as Papua Province in Figures), spatial data for forest cover and the total economic value of forest resources from several studies (IPB, 1999; Simangunsong, 2004; and Kim, 2002).

A1.19 Prepare assessment report

The inputs of team members working together on this issue were drawn together into a comprehensive report that has been translated into Indonesian. The report not only assesses different spatial development scenarios, but also provides a number of maps which visually portray options and scenarios discussed in the report.

A1.20 Workshop to present results of study

In mid September 2008 a workshop was held in Jayapura to present the results of the study and to discuss the environmental, social and economic consequences of development scenarios outlined in the study. The workshop was well attended by government officials, NGOs and other relevant organisations.

A1.21 Prepare summary report

A 5 page summary of the SEA process and the SEA report was prepared and translated into Indonesian to facilitate communication of the reports main results and findings.

ANNEX 2 Stakeholder questionnaire

Background instruction to interviewer:

Ask questions the same way to each stakeholder.

If answer is not clear, ask for clarification.

Observe and listen to stakeholder's choice of words. Write down comments that stakeholder may say in addition to the formal questions.

Always allow stakeholder not to answer if he/she doesn't want to.

Never assume you know the stakeholder's answer – even if you do.

Try not to ask leading questions: i.e. Do you think that it would be a good idea to build a road from Jayapura to Merauke? Instead ask the question as such: "Where to you think strategic road developments could be built to develop isolated regions?"

BEFORE ASKING questions – INFORM the stakeholder of the following:

The inputs will help provincial government identify interests and concerns in relation to the future plans of Papua to help prepare better plans.

The inputs are strictly anonymous. Only stakeholder groups will be identifiable in the report.

This is not a survey. Only selected individuals are included in the stakeholder analysis.

Section 1 – questions on development of Papua

1-1 What is your development vision for Papua?
[Write down in brief]

1-2 From the following options, what are your top 4 development priorities for Papua?
[give points to the different options listed below. 4 points = highest priority, 3 points = second-highest priority, 2 points = third-highest priority, and 1 point = fourth priority.]

____ Explore Mining Opportunities.

____ Explore hydropower - especially in rural Papua.

____ Ensure Papua's natural environment is protected for the future generations.

____ Ensure cheap transportation access to and from most Papuan settlements (goods and people)
(e.g. Air, Road, or Sea transportation).

____ Ensure health & education services to all of Papua.

____ Strengthen Papua's role as bio-fuel producer.

____ Develop plantations. (e.g. palm, cassava, and/or sago).

____ Strengthen community forestry.

____ Ensure sustainable forestry and natural resources management.

____ Strengthen capacities for more community development in rural Papua.

____ Ensure more equitable profit-sharing from Papua's resources.

____ Other. What?

1-3 Why do you prioritize these four?
[write down explanation given]

1-4 How do these development priorities benefit Papua as a region?
[write down explanation given]

1-5 In your view, what are the key constraints and challenges to achieving these priorities?
[write down explanation given and/or tick options]

____ Weak capacities of government
____ Weak capacities of private sector
____ Other people have different priorities - Who/what?
____ Technically or geographically very difficult

1-6 In your view, what are the key strengths and opportunities to achieving these priorities?
[write down explanation given and/or tick options]

____ Government commitment (who? Which department?)
____ Private sector commitment (who?)
____ Other?

Section 2 – questions on "nature of impact" of development in Papua

2-1 In your view, what will the impacts of “exploring mining opportunities” be on majority of people living in Papua?
[tick options and write down comments]

_____ community loss of land?
_____ loss of livelihoods?
_____ improved livelihoods?
_____ loss of culture and/or identity?
_____ improved access to health and education facilities?
_____ increased incomes?
_____ other? What?

2-2 In your view, what will the impacts of “exploring hydropower especially in rural Papua” be on majority of people living in Papua?
[tick options and write down comments]

_____ community loss of land?
_____ loss of livelihoods?
_____ improved livelihoods?
_____ loss of culture and/or identity?
_____ improved access to health and education facilities?
_____ increased incomes?
_____ other? What:

2-3 In your view, what will the impacts of “protecting Papua’s natural environment” be on majority of people living in Papua?
[tick options and write down comments]

_____ community loss of land?
_____ loss of livelihoods?
_____ improved livelihoods?
_____ loss of culture and/or identity?
_____ improved access to health and education facilities?
_____ increased incomes?
_____ other? What?

2-4 In your view, what will the impacts of “developing transportation system throughout Papua” be on majority of people living in Papua?
[tick options and write down comments]

_____ community loss of land?
_____ loss of livelihoods?
_____ improved livelihoods?
_____ loss of culture and/or identity?
_____ improved access to health and education facilities?
_____ increased incomes?
_____ other? What?

2-5 In your view, what will the impacts of “developing health and education facilities” be on majority of people living in Papua?
[tick options and write down comments]

_____ community loss of land?
_____ loss of livelihoods?
_____ improved livelihoods?
_____ loss of culture and/or identity?
_____ improved access to health and education facilities?
_____ increased incomes?
_____ other? What?

2-6 In your view, what will the impacts of "developing Papua's role as bio-fuel producer" be on majority of people living in Papua?
[tick options and write down comments]

_____ community loss of land?
_____ loss of livelihoods?
_____ improved livelihoods?
_____ loss of culture and/or identity?
_____ improved access to health and education facilities?
_____ increased incomes?
_____ other? What?

2-7 In your view, what will the impacts of "ensuring sustainable forestry and natural resources management" be on majority of people living in Papua?
[tick options and write down comments]

_____ community loss of land?
_____ loss of livelihoods?
_____ improved livelihoods?
_____ loss of culture and/or identity?
_____ improved access to health and education facilities?
_____ increased incomes?
_____ other? What?

2-8 In your view, what will the impacts of "focusing on community development" be on majority of people living in Papua?
[tick options and write down comments]

_____ community loss of land?
_____ loss of livelihoods?
_____ improved livelihoods?
_____ loss of culture and/or identity?
_____ improved access to health and education facilities?
_____ increased incomes?
_____ other? What?

2-9 In your view, what will the impacts of "focusing on equitable resources profit-sharing" be on majority of people living in Papua?
[tick options and write down comments]

_____ community loss of land?
_____ loss of livelihoods?
_____ improved livelihoods?
_____ loss of culture and/or identity?
_____ improved access to health and education facilities?

____ increased incomes?
____ other? What?

[Please write additional comments and relevant information from stakeholder so far]

Section 3 – questions on influence over Papua's spatial plans

3-1 Do you know of the proposed spatial plan for Papua?
[tick]

____ Yes
____ No

3-2 [If yes]
Do you know what is proposed in the spatial plan for Papua?
[tick]

____ Yes
____ No

3-3 [If answer is yes]
What do you see as the main priority in the spatial plan for Papua?

3-4 Do you have a say (influence) in Papua's spatial plans?
[tick relevant option]

____ Don't know
____ Little / no influence
____ Some influence
____ Significant influence
____ Crucial influence

Section 4 – questions on consultation and complaints mechanisms for spatial plan preparation

[Explain the global best practice of "free, prior and informed consent"]

4-1 In your opinion, who should have influence on preparation of the spatial plan for Papua?
[write answers]

4-2 In your opinion, how should the spatial plan be socialized in Papua?
[write answers]

4-3 If a stakeholder group in Papua are negatively affected by the proposed spatial plan, do you have suggestions as to how they should be able to complain? What would be a good mechanism in your opinion?
[write answers]

4-4 If a stakeholder group in Papua are negatively affected by the proposed spatial plan, do you have suggestions as to how the negative impacts can be mitigated? E.g. compensation for loss of land.
[write answers]

Section 5 – questions on stakeholder/interviewee background

5-1 Level of schooling _____

5-2 Occupation _____

5-3 Institution/Organization _____

5-4 Place of residence _____

5-5 Suku / Clan _____

5-6 Name _____

5-7 Man / Woman _____

ANNEX 3 Communication brief

Strategic Environmental Assessment for Spatial Planning in Papua Province, Indonesia

Sekala PCSSP NCG

Papua Province

Papua province was formed in 2003 when the Indonesian part of New Guinea island was separated into two provinces. The province is home to more than 2.6 million people, who primarily live in rural areas and rely upon natural resources for their livelihoods. Close to 38% of the province's population live in poverty. This is primarily attributed to the fact that these people live in remote, isolated areas and have limited, if any, access to health, education and markets.

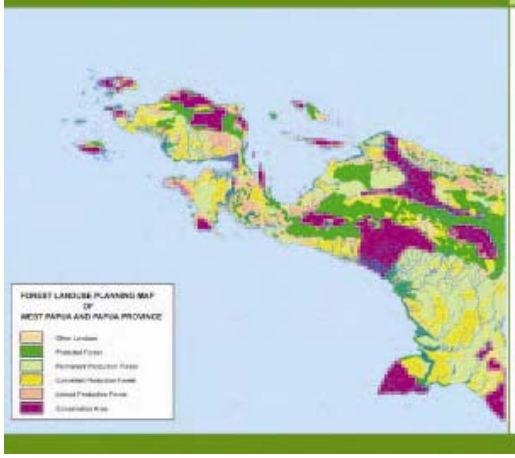
The province is endowed with an amazing range of diverse and unusual ecosystems, including glaciers, alpine meadows, cloud forests, lowland forests, savannahs, peat forests, mangrove forests, coral reefs and seagrass beds. It plays a pivotal role in Indonesia's biodiversity and has already designated 20% of its forest estate for conservation and protection. Deforestation rates have been minimal and the province is primarily covered with intact forests that store large quantities of carbon.

The province is also rich in natural resources (copper, gold, iron ore, coal, oil and gas, fisheries and forests) but remains one of Indonesia's poorest regions.

Papua's Spatial Planning Needs

Papua is a new province which contains several new districts. The creation of these new administration boundaries has created a need to develop new spatial plans that accommodate the development aspirations of the Papuan people while protecting Papua's unique biodiversity.

In 2007, the provincial government of Papua province requested assistance from the World Bank for spatial planning. The World Bank responded to this request by providing funds for a strategic environmental, social and economic assessment of different spatial planning and development options. A consortium of organizations (Sekala, the Papuan Civil Society Strengthening Foundation and Nordic Consulting Group) tendered for the assignment and were awarded a contract to carry out the assessment in August 2007.



What is a Strategic Environmental Assessment?

Strategic Environmental Assessment is an analytical and participatory approach for mainstreaming environmental and social issues into the decision-making and the implementation process at a strategic level. It involves environmental assessment of development programs, plans and policies of non-environmental sectors. A Strategic Environmental Assessment differs from an Environmental Impact Assessment (AMDAL) in that it seeks to inform spatial plans and to proactively address the environmental, social and economic consequences of a proposed plan in order to support decision making.

Objectives of the SEA

This strategic environmental assessment seeks to provide the Papuan government informed advice on different development scenarios. This information can be assessed and utilized to design a provincial spatial plan that offers economic, social and environmental benefits.

The assessment also seeks to help build the capacity of the Papua provincial government to integrate environmental and social concerns into development planning.

The assessment will not result in a new spatial plan, rather it will provide optimal development options that will facilitate economic development and alleviate poverty but balance those options with conservation interests.

Scope and Tasks

The following tasks will be undertaken for this assessment:

1) **Baseline Assessment**: Collect and review relevant information, especially in key areas for spatial planning, such as infrastructure, mining, agricultural development and forestry.
2) **Stakeholder Analysis**: Identify key stakeholders and assess their interests and concerns in relation to spatial planning. This will be based on interviews, focus group discussions and existing information.
3) **Identification of Economic, Environmental and Social Priorities**: Using environmental and socio-economic valuation techniques.
4) **Scenario Building**: Develop range of scenarios for spatial development. Critical factors to be considered for construction scenarios include:
   - Business as Usual (continuation of existing development policies).
   - Poverty alleviation opportunities.
   - Transport/access development options.
   - Land suitability analysis.
   - Carbon storage and avoided deforestation opportunities.
   - Peatland and biodiversity conservation.
5) **Assessment of Effects on Economic, Environmental and Social priorities**: Assess cumulative and induced economic, environmental and social consequences of each scenario over a 5-10 year timeframe.
6) **Geographic Information System**: Incorporate baseline information, development scenarios and projected consequences in a simple GIS that allows for presentation and analysis of spatial data.
7) **Intersectoral Coordination**: Help the provincial government to organize intersectoral meetings with governmental and non-governmental stakeholders to discuss priorities, scenarios, consequences and recommendations.
8) **Training workshop on SEA uses and techniques**: For the staff of key government agencies as well as other stakeholders.

Assessment Consortium

Three organizations will be assisting Papua province to carry out the strategic environmental assessment—Sekala, the Papuan Civil Society Strengthening Foundation (PCSSF) and Nordic Consulting group.

Sekala is leading the consortium. It has expertise in Geographic Information Systems, satellite imagery analysis, remote sensing, satellite image processing, spatial planning, forestry, conflict mediation, community mapping and good governance. It has worked extensively in Papua where it has facilitated community mapping; provided training on forest governance, remote sensing and GIS; and delivered technical assistance for a range of conservation initiatives.

The Papuan Civil Society Strengthening Foundation (PCSSF) is a regional small-grant making institution that was formed to sustain support to civil society in Papua. PCSSF focuses on strengthening community institutions, facilitating multi-stakeholder dialogues, providing support for networking and shared learning and creating space for negotiations with regency, provincial and national level decision makers. PCSSF is primarily responsible for carrying out the stakeholder analysis for this assessment and for ensuring that the assessment is undertaken in a participatory fashion.

Nordic Consulting Group offers advisory services in international cooperation and development and has expertise in institutional development, governance, human rights, economic, financial, social and environmental analysis and infrastructure development. Nordic has extensive experience in undertaking Strategic Environmental Assessment's in other countries, such as Eritrea, Mozambique, Benin, Malaysia and Zambia.

The SEA process has been supported by

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ANNEX 4. Materials for training workshop on SEA

This Appendix gives an overview of the SEA process and puts it into the context of the Strategic Assessment of the Papua Spatial Plan. It discusses what an SEA is and how it was implemented in the context of Papua province; and includes the main scenarios developed. As well as the steps still required for decision-making. The Appendix draws heavily on the OECD DAC Strategic Environmental Assessment good practice guidelines.

What is an SEA?

The SEA is a process for analysing and addressing the environmental effects and consequences of proposed policies, plans and other strategic actions. The process is undertaken to provide information for sound decision-making, and is useful as a tool to mainstream environmental considerations into development policy-making and planning.

The shift towards new development cooperation instruments such as direct budgetary support, policy reform, and sector-wide support programmes has created a need for environmental assessment approaches different from, and more strategic than those most used at the project level (the EIA – environmental impact assessments). The SEA – defined as: a range of analytical and participatory approaches that aim to integrate environmental considerations into policies, plans and programmes, and evaluate the inter-linkages with economic and social considerations [9]– responds to this need.

This allows the integration of environmental considerations alongside social and economic aspects into strategic decision making at all levels and stages of development. An important aspect in the context of Papua Province where poverty alleviation, along with food security, education and health, infrastructure and affirmative action are development priorities, and where only 3% of Papua's land area falls outside the forest estate.

Legal requirements to implement an SEA in the context of programmes likely to have significant effects on the environment are increasing. Thus the EC's SEA Directive [10] which came into effect in 2004 applies to all member states, while the Convention on Biological Diversity[11] encourages the use of the SEA in its implementation. .

Examples of SEA's carried out by NCG include: (i) SEA of transport options for transport of minerals (titanium and iron) in Mozambique; (ii) SEA of a strategic road corridor in Western Zambia; (iii) SEA of the Biodiversity Component of the Malaysian-Danish Environmental Cooperation Programme. Many other examples can be found in the literature, such as, for example, the OECD/DAC guidelines. This includes, for example: (i) SEA of the Sperrgebiet Land Use Plan, in Namibia; (ii) Regional environmental assessment of Argentina flood protection; (iii) Mekong River

[9] Ref: OECD DAC guidelines and reference series: Applying Strategic Environmental Assessment. (Good practice guidance for development cooperation). 2006.
[10] European Directive (2001/42/EC) on the Assessment of the Effects of Certain Plans and Programmes on the Environment.
[11] CBD Article 6b and Article 14; Decision on SEA at COP 8 of the CBD. http://www.cbd.int/decisions/?m=COP-08&id=11042&lg=0 - _Toc124570467

Commission Basin Development Plan, and (iv) Sector environmental analysis of Indonesia Water sector Adjustment Loan. [12]

Steps in the process:-
A typical SEA would consist of four main stages:-

- Establishing the context for the SEA
- Implementing the SEA
- Informing and influencing decision-making
- Monitoring and evaluation.

Establishing the context for the SEA

Screening
The first step in the process was the request from the Papua Government to the World Bank for assistance in the strategic (environmental) assessment of the Papua spatial plan. The Papua Government had identified this as an important and necessary step.

This assessment, however, does not exclude the possibility that more specific SEA's are carried out in the future when decisions are taken on the various potential scenarios developed as part of the SEA process.

A number of examples of the range of programmes where SEAs can be relevant is given in the introduction.

As part of the contextualization of the SEA, key government and non-government stakeholders are identified (including the private sector, NGOs and civil society).

> SEA is designed to explore and evaluate suitable alternatives. The sooner an SEA is introduced to policy formulation and plan-making, the greater the chances are to identify opportunities and influence outcomes.
>
> Source: OECD DAC Guidelines (p.54)

Implementing the SEA

Scoping
Defining the focus and identifying key issues together with the key stakeholders. Looking at what is already happening (the "no change" scenario) and what is already planned; as well as looking for potential alternatives.

In Papua the challenge is to move away from a sectoral planning mode to one which is more spatial – bringing elements from different sectors together within an area-based focus.

Baseline
Collection of materials and integrating this with a mapping exercise which captures existing data – such as the Spatial Data Atlas already prepared. The electronic

[12] Examples takes from the OECD DAC guidelines. http://www.oecd.org/dataoecd/4/21/37353858.pdf

format chosen for integrating data into a series of maps also allows for adding and updating both the database and the maps, as information becomes available.

The mapping exercise also allows for the preparation of visual overlays for different scenarios.

> For spatial plans, the baseline can usefully include the stock of natural assets including sensitive areas, critical habitats, and valued eco-system components. For sector plans, the baseline will depend on the main type of environmental impacts anticipated, and appropriate indicators can be selected.
>
> Source: OECD DAC Guidelines, p.57.

Assessment – identification of alternatives

The assessment of different scenarios should link with the overall development objectives for Papua. This means that the context for the spatial plan needs to be within the framework of poverty alleviation and improved livelihoods, and respect the priorities of: food security, infrastructure, health, education and the improved welfare and rights of indigenous Papuans. All this within the context of support for sustainable natural resource management – extremely important in an area where over 90% of the land area forms part of the forest estate.

Development of scenarios. Assess expected environmental consequences including expected changes in a “no action” scenario.

Identification of alternatives is based on collection of available data, and on stakeholder interviews and stakeholder workshops. Involvement of decision-makers is important but this should also be an inclusive process, but needs to involve a broad range of stakeholders.

Identification of key intervention areas with environmental and social consequences. Thus far, a number of different potential intervention areas/scenarios have been identified:

- Transport and Access scenarios
- Mining Scenarios
- Forestry Scenarios
- Mamberamo Scenarios

The further work with the different scenarios will be to enhance the opportunities and mitigate the impacts. Inspiration can be found resulting from the renewed discussion on the environmental and climate change agenda after the Bali Conference.

The final report outlining the conclusions of the SEA will be short and graphic and written in understandable language to provide a basis for further involvement of stakeholders (including civil society) discussing options and allowing for informed decisions to be taken.

This should contain:-

- The (likely) key impacts for each alternative.
- Stakeholder concerns including areas of agreement and disagreement, and recommendations for keeping stakeholders informed about implementation of recommendations.
- The enhancement and mitigation measures proposed.
- The rationale for suggesting any preferred option and accepting any significant trade-offs.
- The proposed plan for implementation (including monitoring).
- The benefits that are anticipated and any outstanding issues that need to be resolved.
- Guidance to focus and streamline any required subsequent SEA or EIA process for subsidiary, more specific undertakings such as local plans, more specific programmes and particular projects.

Informing and Influencing Decision Making

Review/Decision making

Ideally there needs to be sufficient time available between finalisation of the SEA report and the taking of decisions on the various scenarios to allow for public consultation.

Monitoring and Evaluation

How to monitor – information tracking systems within and outside provincial government. These may need to be built up for each scenario.

Range of actors involved in monitoring: provincial and national government; local government; non-government organizations (Global Forests and Trade Network; FSC, etc.); civil society.

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