Diamond, J.M. 1972. Avifauna of the Eastern Highlands of New Guinea. Nuttall Ornith. Club 12. Cambridge, Massachusetts.
Diamond, J.M. 1973. The distributional ecology of New Guinea birds. Science 179: 759-769.
Flannery, T.F. 1995. Mammals of New Guinea. Reed Books, Chatswood, NSW, Australia.
Flannery, T.F. 1995. Mammals of the Southwest Pacific and Moluccas. Reed Books, Chatswood, NSW, Australia.
Frith, C.B., and B.M. Beehler. 1996. The Birds of Paradise. Oxford Univ. Press, Oxford.
Gressitt, J.L. (ed.). 1982. Biogeography and Ecology of New Guinea. W.R. Junk, the Hague.
Heads, M. 2001a. Regional patterns of biodiversity in New Guinea plants. J. Linn, Soc. London. 136: 67-73.
Heads, M. 2001b. Birds of paradise and bowerbirds: regional levels of biodiversity in New Guinea and correlations with terrane tectonics. J. of Zool., London
Heads, M. 2002. Regional patterns of biodiversity in New Guinea animals. J. Biogeogr. 29: 285-294.
Mack, A. and J.P. Dumbacher. Birds. Pp. 000-000 in A.J. Marshall and B.M. Beehler (eds.) Ecology of Papua. Periplus, Hong Kong?
Welzen, P.C. van., H. Turner, and M.C. Roos. 2001. New Guinea: a correlation between accreting areas and dispersing Sapindaceae. Cladistics 17: 242-247.
Marshall, A. and B.M. Beehler. 2007. Ecology of Papua. Periplus, Singapore.
Parsons, M.J. 1999. The Butterflies of Papua New Guinea: Their Systematics and Biology. Academic Press, London.
Pigram, C.J., and P.J. Davies. 1987. Terranes and the accretion history of the New Guinea orogen. BMR J. Austr. J. Geology and Geophysics 10: 193-212.
Polhemus, D.A., and J.T. Polhemus. 2006. Tectonic geology of Papua. Pp. 000-000 in A.J. Marshall and B.M. Beehler (eds.) Ecology of Papua. Periplus, Hong Kong.
Pratt, T.K. 1982. Biogeography of birds in New Guinea. Pp. 815-837 in J.L. Gressitt (ed.) Ecology and Biogeography of New Guinea. Junk, the Hague.
Supriatna, J. (ed.) 1999. The Irian Jaya Biodiversity Conservation Priority-setting Workshop. Conservation International, Washington, DC.

This paper is prepared only for the inauguration of the headquarters management of Tanah Papua ecoregions in Biak-Numfor

Papua at A Glance :
Ecology, Biogeography and Environment of Papua

(This paper is prepared only for the inauguration of the headquarters management of Tanah Papua ecoregions in Biak-Numfor)

By

Ir. Noak Kapisa, M.Sc
Head of the Natural Resources and Environment Agency of Papua Province

History of Western Explorers

The first Europeans to sail the coastline of Papua were Portuguese, in the 1500s, and they were followed by the whole cast of exploring nations (Spain, the Netherlands, then England). These explorers were seeking trade routes as well as products to trade. This exploring era lasted from the 1500s to the early 1800s. It was followed by a period of regular trade (bêche-de-mer or trepang, bird of paradise skins, turtle shell, massoi bark, etc), which, in turn was followed by initial settlements (trade-driven), then missionary activity.

Early naturalist/explorers included Alfred Russel Wallace, who visited the Bird's Head and Raja Ampat Islands in the 1840s, and Odoardi Beccari and Luigi d'Albertis, who visited the Arfak Mountains in the 1870s. The Dutch made a preliminary claim to New Guinea west of the current border of 141^{o} East Longitude in 1826, but this infamous border was not formalized with the colonial powers of British until 1895 (in the south) and with Germany in 1910 (in the north). What followed was a rather weak attempt to establish government outstations, some rather stronger efforts to explore the interior (1900-1930), and to surmount Papua's forbidding high peaks. Remarkably, the highest summit in Papua was not successfully ascended until 1962, by Austrian Heinrich Harrer.

Dutch, British, and American biological expeditions were conducted into the remote interior in the 1930s. Most famous was the Snow Mountains Expedition led by Richard Archbold, who discovered the populous Baliem Valley in 1938 during his aerial reconnaissance flights that allowed the expedition to successfully ascend high into the interior mountains.

The plantations and logging operations would be concentrated around Papua's coastal fringes, leaving the interior to sustainable development options and conservation.

Such a "smart" plan for developing Papua would keep the extensive interior forest lands in large blocks rather than dissecting them. It would protect the important ecosystem services produced by major catchments. It would ensure the survival of Papua's wildlife riches. And it would balance intensive development in the urban areas with conservation in the interior wild lands. After all, Papua's wild lands are among its most valuable assets. It is its wilderness and its indigenous forest peoples that make Papua unique on earth. As the world becomes more and more urbanized and more uniform, the wild lands and traditional cultures will become more and more precious for their global existence values. Making Papua more like the rest of the developed world is not smart development. Keeping Papua unique culturally and environmentally will prove a winner in decades to come.

References

Allison, A. 1993. Biodiversity of the fishes, amphibians, and reptiles of New Guinea. Pp. 57-226 in B.M. Beehler (ed.), A Biodiversity Analysis for Papua New Guinea. Vol. 2 Conserv. Needs Assessment. Biodiversity Support Program, Washington, DC.

Allison, A. 1996. Zoogeography of amphibians and reptiles of New Guinea and the Pacific region. Pp. 407-436 in A. Keast and S. Miller (eds.), The Origin and Evolution of Pacific Island Biotas, New Guinea to Eastern Polynesia: Patterns and Processes. SPB Academic Publishing, Amsterdam.

Beehler (ed.),B.M., 1993. A Biodiversity Analysis for Papua New Guinea. Vol. 2. Papua New Guinea Conservation Needs Assessment. Biodiversity Support Program, Washington, DC.

Beehler, B.M., and B.W. Finch. 1985. Species Check-List of Bird of New Guinea. Monograph #1. Royal Australian Ornith. Union, Melbourne, Victoria.

Beehler, B.M., T.K. Pratt, and D.A. Zimmerman. 1986. Birds of New Guinea. Princeton Univ. Press, Princeton, NJ.

process. Long term development takes into account issues such as water resources, sanitation, ecosystem services, efficient transportation, and parks for recreation and nature preservation.

Although we all recognize that Papua is an important source of natural resource wealth for Indonesia and perhaps in the world, we must accept that Papua will be best developed if developed by and for the local people of Papua. Development driven by outside forces rarely provides adequate consideration for the local populace and the local environment. Organic development, driven by the local aspirations of the people of Tanah Papua will unfold at an appropriate pace, and with an appropriate trajectory to ensure that local people benefit. And appropriate development usually leads to actions that conserve nature and local cultures.

Tanah Papua is immensely significant to the global environment because it supports large expanses of unbroken natural terrestrial ecosystem, and intact marine ecosystems. These large natural environments are what distinguish Papua from other regions in Indonesia that have been developed rapidly with minimal long-term planning. Papua, then, represents Indonesia's last opportunity to develop a region in an environmentally sustainable manner, which will be good for Indonesia, for the people of Papua, and for the world at large. The world needs a Papua rich in forests and marine resources. As these natural environments grow ever-rarer on earth, they become ever-more precious. These are the places that produce abundant clean water for drinking; rich soils for local gardens; timber and fiber, coral reef and fish for subsistence economies; and large natural ecosystems that stabilize regional weather systems and mitigate climate change. These are valuable for their carbon storage, yes, but they are valuable for so many other compelling reasons.

The ecosystem services provided by large intact forest catchments and intact marine ecosystem are immensely valuable. Biodiversity and nature are important to an ever-more crowded and urbanized world. Let's make a case for them, along with REDD or REDD+. The rich developed countries and the large industries should be investing in these dwindling assets in the same way we want them to invest in carbon sequestration.

The unplanned, "default" push for development in Papua will always be district-by-district, driven by the mandate of district politicians. Every district will lobby for roads and infrastructure. However, a rational and sustainable development regime for Papua would not be district-y-district, but would have a Papua-wide vision—taking account of transportation costs, efficiency, demography, economics, and the environment. This latter development regime would focus development nearest to the markets (on the coasts), and where infrastructure already exists (coastal urban centers). Road networks would be concentrated where the infrastructure lies, not widespread and across all districts (where maintenance costs outstrip productivity gains). The plantations and logging operations would be

Wonderland of Papua

Tanah Papua (here shortened to "Papua"), the western half of the great subcontinental island of New Guinea, encompasses 416,129 km^2 and supports the last large tract of equatorial forest wilderness remaining in Asia (Marshall and Beehler, 2007). Dominated by a huge central cordillera 1 generates abundant rainfall, the rivers of Papua drain northward into a vast interior basin (the Mamberamo) and southward into a triangular alluvial platform that broadens as it reaches eastward to the border with Papua New Guinea. At its westernmost, Papua features the wonderfully diverse Raja Ampat Islands, just off the western tip of the mountainous Bird's Head Peninsula (home of the Arfak and Tamrau Ranges). In turn, the Bird's Head is connected to the main body of Papua by the rugged and curving Bird's Neck isthmus, which also includes ancillary mountainous peninsulas (Wandammen, Onin, Bomberai). The Bird's Head is isolated from the main body of Papua by the incursion of Cenderawasih Bay, which includes the biologically important islands of Biak, Numfor, and Yapen.

In many respects, Papua is nearly a mirror-image of its eastern counterpart, mainland Papua New Guinea, but its mountains are higher (reaching to the snowline), its swamps are larger (e.g., Mamberamo, the Asmat), its population is smaller (about 3.6 millions), and the exploitation of its vast forests less extensive. Papua is home to many traditional cultures—250 by one estimate (Petocz 1989). Many of these are forest-dwelling societies, who have provided remarkably low-impact stewardship of their forest resources. Thus Papua's forest wilderness and diverse marine ecosystems are human-managed natural systems that give the impression of being pristine. For environmentalists, conservationists, and research biologists, Papua is a wonder, a promised land, a rich motherlode of natural and cultural history to be studied.

For nearly a half-century (1962-2000) Papua was essentially inaccessible to all but a few international field researchers (Hope et al. 1976) and thus a *terra incognita*. Outsiders did know that Papua was the home to many undescribed species of plants and animals, not to mention lesser life forms. Jared Diamond re-discovered the Golden-fronted Bowerbird in the Foja Mountains in 1979. Tim Flannery described a new mountain-dwelling tree kangaroo in 1994. Johanis Mogea discovered five new species of palms in 2005. Clearly there is so much for us to learn about this little-studied land.

Physiography, Geography & Geology

Papua is a complex piece of the planet, partly because of its convoluted tectonic history. In brief, the Papuan component of the Australian tectonic plate has been drifting northward, building a prodigious central cordillera as well as sweeping up island arcs in the north and northwest. This plate continues to drift northward and northern coastal ranges are presumably still rising. Mountains define Papuan geography. Two east-west ranges dominate the landscape—the central cordillera (the Merauke Range, "Maoke" is a misnomer) and the north coastal ranges (Cyclops, Foja, and Van Rees/Rouffaer) that extend westward into Cenderawasih Bay as rugged Yapen Island. The Central Ranges have been created by the compression of the Australian Plate with the Pacific Plate, with massive uplift over the last several million years. The highest points of the Sudirman and Jayawijaya Ranges (the western and eastern subsets of the Merauke Range) are oceanic sediments. This cordillera rises to more than 3000 meters for its entire length in Papua, creating a challenge for road-builders wishing to link up the northern and southern catchments. The cordilleran watershed dips rather gradually on its northern face and abruptly on the south side. Heavy rainfall striking the southern escarpment has deeply dissected this southern face, creating scores of sediment-laden and unstable rivers that flow onto a rocky alluvial plain in the south that is almost 200 km wide in the east and only 40 km wide in the far west (west of Timika).

The highest peaks of Papua are scattered about the main cordillera. Highest of all is Puncak Jayakusuma or Puncak Jaya (4,884 m), once known as Mount Carstensz or Carstensz Toppen, which dominates the western terminus of the Merauke Range. Nearby Ngga Pilimsit or Mount Idenburg stands at 4,717 m. In central and eastern segments of the cordillera stand Puncak Trikora (Mount Wilhelmina) at 4,730 m and Mount Mandala at 4,640 m. Small, rapidly-melting glaciers top Jaya and Pilimsit.

The accreted island arcs in the north can be seen today as isolated coastal ranges: the Cyclops, Foja, and Van Rees Ranges (north of the Tariku and Taritatu rivers of the great Mamberamo Basin), mountainous Yapen Island, the Wandammen, Arfak (2,940 m) and Tamrau Mountains (2,824 m) of the Bird's Head (Vogelkop) Peninsula, as well as the Raja Ampat Islands west of the Bird's Head. Strange tectonic contacts apparently have also produced the Kumawa and Fakfak Mountains south of the Bird's Head on the Bomberai and Onin Peninsulas. The Bird's Neck region, which connects the Bird's Head with the main body of Papua, is karstic (with underlying sandstone that has been eroded to form characteristic sink holes and pinnacles), with fjordlands, white sand barrens, and lakes.

Marine life and coral reefs

The marine reef environments found in Cenderawasih Bay and the Raja Ampat Islands are among the very richest on Earth in terms of species diversity. One finds extraordinary numbers of hard corals, mollusks, and reef fishes.

Potential area of coral reef in Cenderawasih Bay estimated about 80.000 hectares with high coral species diversity : 460 confirmed hard coral species, 30 possible additions of known species, and 11 possible undescribed species (need research) . In this area also very rich with reef fishes and it was found more than 209 species of reef fishes, 4 species of turtles, pope, dolphin, shark, etc.

These habitats are also very productive, and form an important sustainable resource for local communities. Seagrass ecosystems also provide crucial ecosystem services for human populations, both locally and globally.

Developing for the Long Term—Thinking Ahead 100 Years

Development of Papua is taking place everywhere all the time. Papua environments are in a continuous state of change. Papua supports a globally significant array of natural environments and so should be developed with care and attention. Papua will benefit most from development that is based on deep thinking and careful planning—attempting to define what will be best for the people of Papua today and a century hence. Development driven by short-term objectives usually leads to long-term problems, just as businesses driven by short-term vision fail over the long term. Thus the best kind of development for the people of Papua (and the Papuan environment) is development driven by careful planning—long-term planning, and planning that engages a wide selection of local stakeholders as participants in the

Vertebrates and Invertebrates

Birds dominate the Papuan vertebrate fauna, with more than 600 species recorded. This includes more than 25 species of birds of paradise, three species of cassowaries, and some two dozen each of parrots, pigeons, raptors, and kingfishers. The mammals are less in evidence, mainly because of chronic hunting and their nocturnal habits.

Fruit-bats, insectivorous bats, tree kangaroos, possums, and rats are the best represented among the 180 or so mammalian species. Amphibians include more than 130 species of frogs, many still undescribed to science. Reptiles include two crocodiles, 83 snakes, and 141 lizards.

The fishes comprise ca 400 freshwater species and more than 2,250 marine taxa (about 1,500 of which inhabit coral reef ecosystems. Of special note are the 36 species of rainbowfish (Melanotaeniinae) that inhabit Papua. This is an incomplete list, undoubtedly, and new taxa of rainbowfish have been described as recently as 1998.

The forest invertebrate fauna is diverse beyond imagination, defying our ability to enumerate it. There are probably in excess of 100,000 species of insects alone, only a fraction of these having been catalogued. Most prominent are the huge and beautiful birdwing butterflies, the giant phasmid stick-insects, several lineages of giant beetle (longicorn, dynastine, etc.), and the world's largest moth (*Attacus atlas*). One can also find freshwater crabs, a range of edible freshwater shrimp and crayfish, and an overabundance of bloodsucking leeches.

Rivers

Papua is scored by a range of major rivers both north and south, and east and west. In the north, the Mamberamo system drains the interior Mamberamo Basin (the Lake Plains or Meervlakte) 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 Van Rees (on the west) on its way to the sea. This ramrod straight, swiftly-flowing stream, is one of the most remarkable on this great island, even though it is only 150 km in length. At the head of the Mamberamo, the river drains the great interior basin swamplands, infested by meander belts and oxbow lakes. The Taritatu or Idenburg, drains the eastern half of the basin and the central mountains to the south, its tributaries reaching to the Papua New Guinea border and nearly to Jayapura. Its western branch, the Tariku or Rouffaer, 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). The Van Daalen drains the north slope of the central cordillera, and thus is a much more substantial flow.

Papua's other great rivers drain the ragged southern escarpment of the central range in the eastern half of Papua. Among these, the Digul is the greatest, followed by the Catalina, which in the mountains becomes the famous Baliem (or Balim) that drains the Grand Valley of the Baliem. Scores of lesser rivers sweep heavy gravels southward toward the muddy Arafura Sea. These turbid and unstable rivers tumble out of the mountains, with torrential flows in the mountain gorges, and heavily braided channels in the flats that spread out from the bottom of the ranges. As one moves westward, one finds river after river, each shorter than the preceding, until the central mountains pinch off the alluvial plain at the bottom of the Bird's Neck.

Lakes

Papua has a few prominent lakes. Lake Sentani, near the capital of Jayapura, was apparently created by the enclosure of a once marine embayment that has been landlocked by the docking of a small terrane that has now uplifted to become the coastal Cyclops Mountains just to the north. The lower Mamberamo features Lake Rombebai, the largest lake in Papua, as well as smaller Lake Bira. These are swampy backwater lakes. At the western end of the central cordillera we find the Paniai, Tigi, Tage and Habema Lakes in an interior highland basin. Lowland lake (Lake Ayamaru) is another wonderlake in Papua. Lake Yamur, on the Bird's Neck is home to a freshwater shark. Finally, highlands lakes (Anggi and Gigi) are found in the Arfak Mountains of the Bird's Head.

Swamps, Mangroves, Savannas

The vast Lake Plains of the Mamberamo Basin are dominated by seasonally inundated swamplands of various types. There are great coastal swamplands along much of the southern coast, from the Casuarina Coast in the southeast to the swamplands south of Timika, far to the west. Elsewhere in Papua, swamps can be found in many alluvial localities where drainage is impeded, around lowland rivers, and in and around Dolok (Kimaam) Island in the far south.

Indonesia's largest mangrove ecosystem lies at the head of Bintuni Bay, Timika and Asmat, which separates the Bird's Head Peninsula from the more southerly Bomberai Peninsula. In the far southeast, by the Papua New Guinea border, is a swath of unique savanna that ranges westward to Dolok Island—part of the great "Trans-Fly" savannas that look more like Australia than New Guinea. This is a highly seasonal low-rainfall zone, that toggles between an inundation season and a burning season.

pandanus, or nipa are commonplace in the vast deltaic areas of the major rivers (e.g., the Digul). These grade into herbaceous swamplands where inundation is the prevalent condition. Coastally, one finds small strips of mangrove or large and extensive mangrove forests, depending upon conditions. These comprise species of *Sonneratia, Xylocarpus, Brugiera, Rhizophora,* and *Avicennia*. Mangrove formations are dominant in the south and southeast, between the southern Bird's Head and Bomberai Peninsula, and along the Waropen coast (northeastern Cenderawasih Bay). In the far southeast one encounters closed monsoon forest that grades southward into *Melaleuca* woodland and *Eucalyptus* savanna.

Much of Papua is hilly, and here forests are on well-drained soils and tend to be less grand, with smaller-boled trees of lesser height. In the low hills on the southern side of the central cordillera above Timika one finds a very poor "white sand" scrub forest or heath forest that is both structurally bizarre and taxonomically distinct. Above 1,000 m one encounters submontane forests that in places are dominate by oaks (*Castanopsis acuminatissima*, *Lithocarpus* spp.) and several genera of Lauraceae. A cloud line settles on the mountains at varying elevations, depending on local conditions. This produces cloud forest conditions, which are typified by the abundance of moss on tree trunks as well as an effusion of epiphytes. This cloud line is most typically found between 1,500 and 2,500 meters elevation. Mid-montane forests are more species-poor and can be dominated by the Antarctic beech *Nothofagus* as well as several genera of gymnosperms from the family Podocarpaceae (*Podocarpus, Dacrycarpus, Dacrydium, Phyllocladus*). Above 3,000 meters, one encounters dense elfin forest that is composed of low (15 m), small-boled (10-30 cm dbh) trees that are heavily coated in moss and that has tangled moss-laden root mats on the ground in the place of soil. Climbing higher into the mountains, one encounters areas where patches of dense thicket-like dwarf forest is interdigitated with open boggy grasslands in the more poorly-drained and frost-prone areas. In these areas one can find prominent stands of large *Dacrycarpus compactus* as well as the more conifer-like *Libocedrus papuanus*. On the summit areas above 4,000 m one encounters a mix of tussock grasslands, rocky areas, low ericaceous thickets, and a variety of tropicalpine herbaceous vegetation.

Botanically, Papua is remarkable, estimated to house more than 15,000 species of vascular plants, notably some 2,000+ species of orchids, more than 100 rhododendrons, two species of the great and ancient *Araucaria* conifers—Papua's tallest tree—as well as the magnificent and valuable kauri pine (*Agathis* species). Dipterocarp trees are relatively uncommon, but appear in abundance in certain patches, presumably as a result of some natural disturbance regime. Other important timber trees include *Intsia bijuga* ("Merbau"), *Pometia pinnata* ("matoa"), *Pterocarpus indicus* ("rosewood"), *Dracontomelon* ("black walnut"), among others.

Forest types

Closed forest is the default vegetation type over virtually the entirety of Papua except perhaps in the southeast (although the fire regime that produces savannas there may be anthropogenic). Papua's forests are highly species rich, with minimal stand dominance by particular tree species, and with remarkable historically-driven variation from site to site, even within single catchments. One-hectare stands of forest typically support between 70 and 200 species of trees larger than 10 cm diameter at breast height (dbh). It is thus difficult to taxonomically characterize the forest types of Papua. Instead, types are delineated by elevation, rainfall, and structure. In general, New Guinea's forests can be termed "tropical humid forests." Tree species of the following families are important components of this tree flora: Myrtaceae, Moraceae, Lauraceae, Meliaceae, Myristicaceae, Sapindaceae, Euphorbiaceae, Combretaceae, Sapotaceae, Annonaceae, Clusiaceae, and Rubiaceae (Oatham & Beehler 1997).

In the lowlands, one finds tall alluvial forests in well-drained catchment basins, as well as various types of periodically-inundated swamp forests in more poorly drained areas. The finest alluvial forests are grand with emergent species reaching 70 meters (e.g., *Octomeles sumatrana*), and canopy height topping 45 meters. The canopy of this alluvial lowland forest is often irregular and broken, except where there has been uniform regeneration after some disturbance. Typical canopy tree genera of the wooded swamps include *Barringtonia, Terminalia, Alstonia, Diospyros, Carallia, Syzygium,* and *Campnosperma.* Palm swamps, dominated by sago,

Coasts

Papua's abundant coastline is not uniform. In the northeast, one finds hilly country reaching the coast, which features a mix of white sand beaches and rocky shorelines. Long stretches of beach dominate in the north, backed by coastal hills.

The eastern shore of Cenderawasih Bay features swamps and mangroves, whereas the western shore is more rugged and hilly. The north side of the Bird's Head is rugged, whereas the southside is low and swampy.

Much of the southern and southeastern coastline is low and silty, with dark sand beaches backed by casuarinas, with swamplands further inland. The most spectacular coastlines are found on the south side of the Bird's Neck, between Arguni Bay and Etna (Lakahia) Bay. Here one finds tropical karstic fjordlands that feature coastal mountains rising to more than 1,000 meters, steep cliffs, deep embayments, and scenery galore.

Islands

Papua has more than a thousand fringing islands, from tiny to quite large. The Raja Ampat Islands range off the western coast of the Bird's Head Peninsula, and include Waigeo (3,155 km^2), Salawati (1,632 km^2), Misool (2,041 km^2), Batanta (453 km^2), and Kofiau (150 km^2), among others. This remarkable archipelago supports the world's richest coral reefs and considerable endemic forest biodiversity (e.g., Wilson's Bird of Paradise, Red Bird of Paradise, Waigeo Brush-turkey).

The islands of Cenderawasih Bay include two isolated oceanic islands with distinct island faunas; Biak/Supiori, (2,497 km^2); and Numfor (311 km^2), as well as the mountainous land-bridge island of Yapen (2,227 km^2). In addition there are the Padaido Islands southeast of Biak, and Num Island

west of Yapen, and a number of small coastal islands in the south and west portions of the Bay.

Small islands also dot the north coast and fringe the Fakfak and Triton Bay region. Papua's largest island is Dolok (11,192 km^2), which was apparently formed from the vast outwash from the silt-laden rivers of the southeast coast. It is often overlooked because of its unprepossessing nature and isolation, and its minimal distance from the mainland.

Ecological Setting

New Guinea is the northern quadrant of the Australian tectonic plate, thus this island is one with the Australian continent. And yet in spite of geological linkages, there are considerable environmental differences. In particular, Australia today is largely dry and temperate, whereas New Guinea is tropical and perhumid. These two fundamental distinctions can explain much of the differences between these sister biotas, north and south. Latitude and climate can explain much.

Climatologically, Papua is remarkable mainly for its cloudiness. It is perhaps one of the cloudiest places on earth. Spanning latitudes from the Equator to 12 degrees South Latitude, Papua's equatorial climate is seasonally dominated by the Northwest Monsoon and the Southeast Trade Winds. In most parts of Papua, the effects of the Northwest Monsoon dominate in the period from November to March, bringing rain and unsettled weather. The Southeast Trade Winds tend to bring cool and dry weather, and predominate from April until September. That said, Papua has many micro-climates.

Rainfall regimes range from low in the southeast (less than 2,000 mm/yr) to extremely high on the southern escarpment of the central cordillera (more than 5,000 mm/yr). The highest rainfall on record for Papua is from Tembagapura town, which receives 7,500 mm/yr on average. In the wetter areas, the typical seasons are reversed, and the most rain falls in the April-October period. In fact, the wettest sites receive rain from both the monsoon and the trades, and they tend to be found in the mountains along the southern front of the cordillera. Moreover, annual accumulation in the very wettest areas tends to show great variability.

Rain shadows exist in some interior valleys (such as the Baliem), on the Bomberai Peninsula, 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 three meters a year.

Seasonally, temperature varies little, except with elevation. At sea level, in the forests near Timika, one will encounter an unpleasant combination of high humidity and warm temperature day and night on all but the coolest days of the austral winter. Temperature does vary predictably

with elevation. This so called "lapse rate" is equivalent to approximately a 5-6^o C decrease in temperature per 1000 m elevation. Thus at 4,000 meters in the Sudirman Range one regularly encounters night frosts during the dry season, when the skies are clear. Above 4,500 m periodic snowfalls are common, and glaciers cap the highest peaks of the Carstensz Range. These glaciers expanded outward and downward during the Pleistocene cooling, melted altogether by 6,000 years BP, and returned during the recent cooling, only to begin retreating again in the last century as global temperatures have increased.

Elevation and temperature is a defining environmental phenomenon in mountainous Papua. This allows essentially distinct biotas to inhabit adjacent patches of land, separated only by elevation. Many species inhabit discrete elevational zones in Papua's mountains. The lower zones tend to be the most species-rich, the highest zones the most species-poor. This gradual attenuation of species richness, which parallels the gradual and steady reduction of available land area at the higher elevations, is one of the most distinct phenomena in Papuan ecology. A reverse trend can be found in species endemism. The highest levels of endemism can be found at the highest elevations.

Papua is a land in flux. Significant chronic disturbance is produced by ongoing mountain-building in contest with rainfall-driven erosional processes, as well as by periodic vulcanism, human-caused and naturally-occurring fire regimes, plus El Niño drought. Over the long history of human occupation, swidden agriculture has disturbed large swaths of habitat, most of which is now regenerated forest. Thus historical disturbance is a dominant factor dictating the distribution and pattern of today's vegetation. Much of what appears to be "virgin rainforest" is, in fact, the product of recent and not-so-recent patch disturbance. This is abundantly evident when conducting plot-based plant surveys in the forest. Thus any attempt to characterize forest types is a rough generalization, and at best a qualitative assessment with minimal predictive power even when applied to adjacent plots.

Design by :
Bapesdalh Prov.Papua
2012

Papua at A Glance :

Ecology, Biogeography and Environment of Papua

By
Ir. Noak Kapisa.M.Sc
Head of the Natural Resources and Environment Agency of Papua Province


© WWF-Indonesia / Ita Tangkepayung
© Tim Parry