

# PAPUA NEW GUINEA

## INTRODUCTION

by Patrick L. Osborne

**Area:** 462,000 sq.km.

**Population:** 3,006,800 (1980 census).

Papua New Guinea is divided politically into nineteen provinces and the National Capital District around Port Moresby. Although the population of just over three million is small in relation to the land area (462,000 sq.km), the population is estimated to be growing at a rate of 2.1% per annum, and 48% per cent of the population is under 15 years of age. The capacity of the land to support this rapidly growing population is extremely limited. Over 95% of the land is held under customary tenure, and most of the rural people rely to some degree on the natural resources for their livelihood.

Papua New Guinea is situated between the stable land mass of Australia and the deep ocean basin of the Pacific. The island of New Guinea is divided politically into Irian Jaya (Indonesia) and Papua New Guinea. Most of Papua New Guinea experiences a relatively high annual rainfall of 2,500-3,500 mm. Some lowland areas are drier but annual rainfall of less than 1,000 mm is restricted to the National Capital District and surrounding areas. Large areas of the highlands receive in excess of 4,000 mm per year, and in some places a rainfall of over 10,000 mm per year has been recorded. Three basic rainfall patterns are evident: (a) rainy season in the middle of the year (May-August); (b) relatively uniform distribution of the rainfall throughout the year; (c) rainy season from December-March (Abeyasekera, 1987). Air temperatures are high throughout the year with little seasonal variation. Daily mean maximum temperatures on the coast are around 30-32°C, with minima around 23°C. With increasing altitude, the absolute and average temperatures decrease. Above 2,200m altitude, frosts occur but only rarely. Frosts are more common at over 3,000m altitude and snow occasionally falls on the higher mountains. The combination of high rainfall and temperature results in high humidity, cloudiness and only moderate rates of evaporation.

The relief of Papua New Guinea is dominated by a broad central cordillera that runs through the middle of the country. On the border with Irian Jaya, the main mountain range is about 100 km wide, but it increases in width in the central highlands region to 300 km. From there the cordillera narrows towards Mime Bay. These highlands are a complex system of ranges and valleys. The highest peaks are Mount Wilhelm (4,509m), Mount Giluwe (4,368m), Mount Albert Edward (3,990m) and Mount Victoria (4,035m).

North of the central cordillera is a depression which is occupied by the Sepik River in the west and by the Ramu River to the east, but is separated from the Sepik-Ramu wetlands by low ranges to about 1,200m altitude. The Markham River occupies the eastern part of this great northern depression. To the south, in the western part of Papua New Guinea, there is a huge tract of low-lying land drained by the Fly and Strickland Rivers. The Purari River has a large catchment area (33,670 sq.km), draining the central highlands. The area east of the Purari River consists of the coastal plains of Gulf and Central Provinces. These coastal plains are swampy areas traversed by meandering rivers with associated oxbow lakes. The

lower reaches of the rivers have extensive floodplains that may be seasonally inundated giving rise to vast swamps. Smaller wetlands are found in the highlands and on the islands.

The flora of Papua New Guinea is one of the richest in the world. This is probably due to the country's great diversity of habitats from lowlands with tropical rainforest, monsoon woodlands, savanna, grasslands and freshwater swamps and mangroves to high mountains with frequent frosts and occasional snow falls.

### **Summary of Wetland Situation**

Given the high rainfall and generally rugged topography, rivers are usually fast-flowing with very high discharges. Consequently, except in the broader lowland areas, most rivers in Papua New Guinea have a poorly developed aquatic fauna and flora.

Chambers (1987) has recorded a total of 5,383 freshwater lakes with a surface area of greater than 0.1 ha. More than half (3,003) are equal to or less than two ha, and only 22 lakes are larger than 1,000 ha. The total surface area of all lakes was estimated to be 229,600 ha. Over 75% of the lakes are in Western and East Sepik Provinces. The lakes of Western Province fall into two categories: tributary lakes and oxbow lakes. Tributary lakes are formed by the blocking of a tributary by a river and are usually shallow (e.g. Bosset Lagoon and Lake Daviumbu). Oxbow lakes are of variable depth depending on age. The largest lake in Papua New Guinea, Lake Murray (65,000 ha), lies in a shallow depression (maximum depth 10m) between the Strickland and Fly Rivers. Most of the lakes associated with the Sepik River are oxbows, although the second largest in the country (Chambri Lake) fills a shallow depression. The aquatic vegetation of the lower Sepik River has been greatly altered by the introduction of *Salvinia molesta*. This weed has covered large areas of the lakes in the middle and lower Sepik Valley but biological control measures have been remarkably successful.

Over 80% of the lakes in Papua New Guinea lie below 40m above sea level, and only 4% are over 2,000m in altitude (Chambers, 1987). Some of these lakes have been comparatively well-studied. This is especially true of lakes Aunde and Piunde on Mount Wilhelm.

Mangrove swamps occupy large parts of the coastal areas in Papua New Guinea. They are normally found along protected bays and near the mouths of rivers. The largest areas of mangroves occur in the south especially in the Gulf of Papua into which several large rivers flow (e.g. the Fly, Kikori and Purari). The north coast is not as rich in mangroves as the south coast but *Avicennia alba* and *Sonneratia caseolaris* have been recorded there and not on the south coast. Conversely, *Avicennia officinalis* has only been found on the south coast. Cragg (1987) has recently described the biological and ecological characteristics of mangrove forests in Papua New Guinea, and reviewed their exploitation and management.

It is estimated that the mangrove forests in the Gulf of Papua occupy an area of between 162,000 and 200,000 ha (including nipa palm stands). Rhizophoraceae dominate with 121,500 ha (56%) while species of *Bruguiera* and *Camptostemon* comprise 18% and 14% respectively. In the Purari Delta, there are about 134,000 ha of mangroves. The Central Province including the National Capital District has an estimated 57,770 ha of mangrove swamps.

Mangroves in Papua New Guinea provide food, building materials, energy (firewood) and medicine (Rau, 1984). While large areas of mangroves in remote regions are untouched, those near urban areas and in proximity to development schemes are subject to various

degrees of degradation. Some of the developments that have resulted in indiscriminate felling of mangroves include oil and gas exploration in the Gulf of Papua, various timber projects and port developments. The felling of mangroves for firewood in urban areas is also now causing concern. No conservation areas have been established exclusively for mangroves, but mangroves in Wildlife Management Areas are protected (e.g. at Maza in the Western Province and N'Drolowa in Manus Province).

Paijmans (1976) has recognized the following categories of wetlands in Papua New Guinea:

1. Saline and brackish swamps
  - mangrove scrub
  - low mangrove forest
  - mature mangrove forest
  - *Avicennia* scrub and woodland
  - *Excoecaria* scrub and woodland
  - nipa palm woodland)
2. Lowland freshwater swamps
  - aquatic vegetation
  - herbaceous swamp vegetation
  - *Leersia* grass swamp
  - *Saccharum-Phragmites* grass swamp
  - *Pseudoraphis* grass swamp
  - mixed swamp savanna
  - *Melaleuca* swamp savanna
  - mixed swamp woodland
  - sago swamp woodland
  - pandan swamp woodland
  - mixed swamp forest
  - *Camptosperma* swamp forest
  - *Terminalia* swamp forest
  - *Melaleuca* swamp forest)
3. Lower montane zone
  - sedge-grass swamp
  - *Phragmites* grass swamp
  - swamp forest
4. Upper montane zone
  - herbaceous swamp vegetation

#### Saline and brackish swamps

- Mangrove scrub: A dense scrubby vegetation of pioneering mangroves found on the seaward side of muddy shores. The dominant species are *Avicennia marina*, *Sonneratia caseolaris* and *Ceriops tagal*.
- Low mangrove forest: Dense, even-aged, one-layered forest of *Rhizophora* pioneers in sheltered positions or develops after *Rhizophora* has invaded colonizing stands of *Avicennia* and *Sonneratia*.
- Mature mangrove forest: Mangrove forest inland with a more open canopy allowing the development of an understorey. Species of *Bruguiera* and *Rhizophora* dominate.
- *Avicennia* scrub and woodland: In areas with low and markedly seasonal rainfall, *Avicennia marina* is the most common mangrove species. It forms scrub and woodland on both the seaward and landward side of mangrove vegetation.

- *Excoecaria* scrub and woodland: *Excoecaria agallocha* is characteristic of brackish fluctuating swamps on the inner side of mangrove vegetation in low rainfall areas.
- *Nipa palm* woodland: Woodland consisting of *Nypa fruticans* covers extensive low-lying areas in estuaries subject to daily brackish flooding, and also lines tidal creeks where fresh and salt water meet and mix.

#### Lowland freshwater swamps

- Aquatic vegetation: This type consists of free-floating, floating-leaved and submerged plants. These either form a mixture or are arranged in concentric zones. They occupy the shallow margins between open water and grass swamp, and in places cover entire lakes that have a uniform depth.
- Herbaceous swamp vegetation: Herbaceous communities consisting of sedges, herbs and ferns are characteristic of stagnant, permanent, relatively deep swamps. Common species include *Thoracostachyum sumatranum*, *Scieria* sp, *Hanguana malayana* and the fern *Cyclosorus* sp. *Phragmites karka* often dominates along gently sloping swamp margins whereas *Pseudoraphis spinescens* and *Ischaemum polystachyum* form narrow bands along more steeply sloping, wet-dry margins.
- *Leersia* grass swamp: Grasses such as *Leersia hexandra*, *Echinochloa stagnina*, *Oryza* spp, *Panicum* sp and *Hymenachne amplexicaulis* occupy permanently swampy river plains that may be under three meters of water in the flood season. Herbs such as *Polygonum* spp, *Ludwigia* spp and *Ipomoea aquatica* may be anchored in the grass mat and reach out over open water.
- *Saccharum-Phragmites* grass swamp: Tall swamp grasses, mainly *Saccharum robustum* and *Phragmites karka*, grow in swamps that are shallower than those described above and may be intermittently dry.
- *Pseudoraphis* grass swamp: *Pseudoraphis spinescens* is a low creeping swamp grass that is most extensive in southwestern Papua New Guinea. Here it forms dense, almost pure stands on flood plains that are seasonally dry. These grasses are heavily grazed by deer and wallabies.
- Mixed swamp savanna: This is a transitional vegetation type between purely herbaceous swamps and swamp woodland; it occurs in permanent, stagnant swamps. In addition to an herbaceous cover, there is an open layer of trees such as *Nauclea*, *Camposperma*, *Syzygium* and *Melaleuca*.
- *Melaleuca* swamp savanna *Melaleuca* swamp savanna is characteristic of the fluctuating backswamps of the middle Fly and Strickland Rivers and also occurs along parts of the monsoonal south and southwest coasts. *Melaleuca* trees form an open, almost pure canopy.

In the wet season, *Melaleuca* swamp savanna is inundated and colonized by aquatic plants. Mixed swamp woodland: In permanent swamps, the tree storey of mixed swamp woodland is generally open and ranges from low to tall. Common trees are *Camposperma* spp, *Nauclea coadunata*, *Mitragyna ciliata* and *Timonius* sp. Palms and pandans fill in much of the space below the trees and *Hanguana malayana*, sedges and *Cyclosorus interruptus* form a dense ground cover.

- Sago swamp woodland: The sago palm *Metroxylon sagu* is a widespread tall shrub that grows in more or less permanent swampy woodland. All gradations occur from stands of pure sago to woodland with a dense layer of trees and an open lower tier of sago. The palm grows best where there is a regular influx of fresh water.

- Pandan swamp woodland: Swamp pandans occupy a habitat similar to that of sago palm but have a wider range. They form open to quite dense, pure stands in shallow, fresh to brackish, stagnant to frequently flooded swamps.
- Mixed swamp forest: This is the most common type of swamp forest. It generally has an open but occasionally dense canopy. Some of the commoner trees include *Camptosperma* spp, *Terminalia canaliculata*, *Nauclea coadunata*, *Syzygium* sp, *Aistonia scholaris*, *Biscofia javanica* and *Palaquium* sp.
- *Camptosperma* swamp forest: The densest stands of *Camptosperma* (*C. brevipetiolla* and *C. coriace*) are found in permanently flooded backswamps. Sago may form a dense understorey.
- *Terminalia* swamp forest: This type occurs mainly in North Solomons Province where *Terminalia brassii* grows together with *Camptosperma* spp, and locally dominates in the canopy of open swamp forest. It is found in low-lying, frequently flooded, bouldery and sandy rivers and in peat swamps with flowing water.
- *Melaleuca* swamp forest: *Melaleuca* swamp forest is mainly confined to monsoonal southwestern Papua New Guinea, where it occurs in narrow bands in seasonally dry swamps along rivers. The main species is *Melaleuca cajuputi*.

#### Lower montane zone

- Sedge-grass swamp: Communities dominated by sedges and grasses occur above about 1,800m in swamps occupying intermontane basins, local depressions in valley floors and seepage slopes. Many different sedges are present and they commonly make up most of the ground cover. Characteristic grasses are *Arundinella furva*, *Isachne* spp and *Dimeria* spp.
- *Phragmites* grass swamp: *Phragmites karka* commonly forms pure stands in seepage areas on slopes and on flat valley floors to over 2,500m above sea level. *P. karka* also occurs associated with *Miscanthus floridulus* along river banks and swamp margins.
- Swamp forest Lower montane swamp forest grows in small patches fringing intermontane basins. The forest has a low and open canopy over a dense layer of small trees and shrubs and a sparse herbaceous ground cover. Common trees include species of *Syzygium* and *Garcinia*, and locally *Nothofagus perryi*.

#### Upper montane zone

- Herbaceous swamp vegetation: Herbaceous communities consisting of a mixture of low herbs, sedges, grasses and mosses occupy depressions, fringe open water and, in the higher parts of the zone, also occur on slopes. Common grasses include *Anthoxanthum angustum*, *Agrostis reinwardtii* and *Monostachya oreoboloides*. The sedge *Carpha alpina* and the fern *Gleichenia vulcanica* locally form pure stands. Common shrubs include species of *Leucopogon*, *Drapetes*, *Vaccinium* and *Trochocarpa*.

### **Wetland Fauna**

No systematic or comprehensive surveys have been made of the fauna of any wetland in Papua New Guinea. The vertebrate fauna is relatively well known, but there is very little information on the distribution and habitat requirements of invertebrates. It is, however, pertinent to note that the very lack of such information reflects the present state of knowledge of the majority of wildlife species in Papua New Guinea. A systematic programme of research is not yet underway, and the present wetland survey highlights this fact.

In general, the fish fauna of Papua New Guinea is closely related to that of northern Australia. The Draft Inventory of Wetlands in Papua New Guinea (Osborne, 1987) lists 150 native species of freshwater fishes belonging to 29 families. These freshwater fishes are mainly derived from marine ancestors belonging to the orders Pristiformes, Clupeiformes, Siluroideiformes, Beloniformes, Syngnathiformes, Mugiliformes, Perciformes and Pleuronectiformes. The country completely lacks fish belonging to the true freshwater fishes of Southeast Asia, the saltwater barrier of Wallace's line forming an insurmountable obstacle to their eastward progress (Munro, 1972).

At least 22 species of fishes have been introduced into Papua New Guinea, representing 19 genera, 11 families and all six continents. As yet, none provides a major source of protein, although tilapia (*Tilapia (Oreochromis) mossambica*) from Waigani Lake is an important local food in Port Moresby (Chambers, 1987). This species also dominates the subsistence fishery in the lower Sepik River. The Common Carp (*Cyprinus carpio*) is now well established and abundant in the highlands, and has also migrated into the Sepik River system.

Of the three orders of amphibians, neither caecilians nor salamanders occur in Papua New Guinea. Frogs (Anura) are well represented, with 150-200 species of five families described at present and new species being recognized as current research proceeds. The five families are Bufonidae (one introduced species), Hylidae (about 70 species), Leptodactylidae (about 5-10 species), Microhylidae (about 90 species) and Ranidae (about 10-15 species). The majority of species are endemic to either Papua New Guinea, or the island of New Guinea. A southern group having its origins in Australia can be recognized, as can a group of species originating from the Solomon Islands to the southeast. The surrounding islands have, in general, a depauperate amphibian fauna in comparison with the adjacent mainland.

Reptiles are represented by two species of crocodiles, 150-200 species of lizards, 90-95 species of snakes and 11 species of tortoises and turtles.

The two species of crocodile are the New Guinea or Freshwater Crocodile *Crocodylus novaeguineae* and the Estuarine or Saltwater Crocodile *Crocodylus porosus*. Both species are still found in relatively large numbers and are heavily exploited for hides and meat. The endemic Freshwater Crocodile is the commoner species, though less widespread. It is restricted to the mainland whereas the Estuarine Crocodile is also found on most of the surrounding islands. The Freshwater Crocodile prefers a freshwater environment but is occasionally found in brackish waters such as the Fly delta. It is more often found in sluggish, shallow water rather than fast-flowing or deeper areas (Burgin, 1980a). The Estuarine Crocodile characteristically occurs in brackish areas such as estuaries and mangroves. Although once thought to be restricted to the coastal tidal areas, the species is now known to occur well inland. The inland populations are generally associated with freshwater pools and deep rivers, but the species has been recorded from fast-flowing rocky streams up to 1,000 km inland (Burgin, 1981). *C. porosus* is relatively easy to hunt as its nests are easy to locate, and as a consequence, it is now rare in the large mangrove areas of Gulf and Western Provinces and also in East and West Sepik Provinces where it was once apparently common.

Numbers of both species declined during the late 1950s and 1960s through indiscriminate hunting. In 1969 the Crocodile Trade (Protection) Act (Chapter 213) was implemented, placing a ban on trade in skins greater than 51 cm belly width. This halted further decline in crocodile numbers, as indicated by a steady level of export during the 1970s. In 1981, a ban was placed on trade in skins smaller than seven inches. This ban was established because Papua New Guinea was in a position to ranch crocodiles on a large scale (Bolton, 1978;

Bolton & Laufa, 1979; Burgin, 1980b). By 1984, although the number of skins exported was the same as in previous years, 30% were from ranched animals and consequently were of higher grade and greater size. In 1982, extensive monitoring of both species commenced, especially in the Ambunti District of East Sepik Province. Between 1982 and 1985, the number of *C. porosus* nests virtually doubled in this area, indicating the effectiveness of the management policy.

Of the 150-200 species of lizard belonging to five families, only certain members of the dragon lizards (Agamidae) and monitors (Yaranidae) are habitually associated with water. The Water Monitor *Varanus indicus* and Gould's Monitor *V. gouldii* appear to be equally at home in fresh water or on land, although their food habits show them to be primarily land animals.

Of the six families of snakes recorded from Papua New Guinea, three families are typically aquatic and can be expected in the still and slow-flowing waters of the lowlands. The file-snakes (Acrochordidae) include one or two genera with two or three species according to taxonomic opinion. The water-snakes of the family Colubridae (genera *Amphiesma*, *Cerberus*, *Fordonia* and *Myron*) are regular inhabitants of wetlands, although the family also includes many species restricted to land. Sea-snakes (Hydrophiidae) are represented by just over 20 species in eight genera. These are all marine, although *Enhydria* and *Schistosa* have been recorded in some northern rivers away from the sea. Several species are frequently seen in shallow water over reefs and presumably occur in mangrove waters.

There are six species of marine turtles in the seas around Papua New Guinea, and two species of freshwater turtles, the Pit-shelled Turtle *Carettochelys insculpta* and the Soft-shelled Turtle *Pelochelys bibroni*. Both the freshwater turtles are found in fresh waters south of the central cordillera; *C. insculpta* is almost totally restricted in distribution to southern Papua New Guinea, while *P. bibroni* is found also in the fresh waters of the Sepik wetlands and occurs west through Indonesia to India. Five species of tortoises (Chelidae) occur in the freshwater wetlands of Papua New Guinea (Goode, 1967). Four of these are found only south of the central cordillera and are inhabitants of still or slow-flowing water bodies. *Elseya novaeguineae* and *Chelodina siebenrocki* are endemic to New Guinea, and *Chelodina parkeri* is endemic to the Fly River Basin and coastal areas.

The avifauna of Papua New Guinea is relatively well documented, e.g. Beehler and Finch (1985) and Beehler *et al.* (1986). Of the 708 species of birds listed for New Guinea, some 115 are waterfowl, and all but three of these occur in Papua New Guinea. Seven species are endemic to the New Guinea region: the Forest Bittern *Zonerodius heliosylus*, Salvadori's Duck *Anas waigiensis*, four mountain forest rails of the genus *Rallina* (*R. rubra*, *R. leucospila*, *R. forbesi* and *R. mayri*), and the New Guinea Flightless Rail *Megacrex inepta*. All are present in Papua New Guinea except for *R. leucospila*, which is confined to the mountains of the Vogelkop Peninsula in Irian Jaya. About 52 species of waterfowl are breeding residents; the remainder is either passage migrants and winter visitors from Asia (over 40 species) or dry season visitors from Australia (about 20 species).

The breeding waterfowl include two grebes, two cormorants, *Anhinga novaehollandiae*, about 12 species of herons and egrets, *Ephippiorhynchus asiaticus*, *Anseranas semipalmata*, nine species of ducks, 15 species of Rallidae, *Grus rubicunda*, *Irediparra gallinacea* and six species of shorebirds (including the woodcock *Scolopax saturata*). The great majority of passage migrants and winter visitors from Asia are shorebirds (30 regular species and seven vagrants). Several of these occur in very large numbers *en route* to and from wintering areas in Australia. Other northern migrants occurring in significant numbers include *Ixobrychus sinensis*, *Anas querquedula*, *Chlidonias leucoptera*, *Sterna hirundo* and *S. albifrons*.

Regular migrants from Australia include *Pelecanus conspicillatus*, several herons and egrets, *Threskiornis molucca*, *Carphibis spinicollis*, *Plegadis falcinellus*, *Platalea regia*, *Haematopus longirostris*, *Stiltia isabella*, *Charadrius cinctus*, *Larus novaehollandiae*, *Chlidonias hybrida* and *Hydroprogne caspia*. In addition, several species which breed in Papua New Guinea also occur as common dry season visitors from Australia.

There are no less than 22 species of kingfishers (Alcedinidae) in New Guinea, but many of these are birds of forest or savanna, and are not particularly associated with water.

Of the 190-200 species of mammals occurring in Papua New Guinea, only three can be clearly tied to the presence of water; two species of lowland water-rat, *Hydromys chrysogaster* and *H. neobritannicus*, and one upland species, *Crossomys moncktoni*. These occur in slow-flowing and fast-flowing rivers, particularly with clear water, but are not common elements of the wetland fauna.

Mention should also be made of the introduced deer, the Javan Rusa *Cervus timorensis*, which occurs in large numbers in the seasonally-flooded trans-Fly area, and in lesser numbers in wetland areas near Port Moresby. These populations are typically swamp-dwellers and frequently graze with their head submerged.

### **Wetland Area Legislation**

There is no specific environmental legislation directed primarily towards the conservation of wetlands. Protection is, however, afforded under a number of Acts.

The Conservation Areas Act 1978 allows for the establishment of "Conservation Areas", these being areas of land deemed worthy of legal protection for a variety of reasons. Assent for, and control of, each Conservation Area is the responsibility of the landowners.

The Fauna (Protection and Control) Act 1974-1982 allows the systematic management, use and conservation of the fauna of Papua New Guinea. Wildlife Management Areas may be established under this Act. These are similar to Conservation Areas but their purpose is restricted to the management of wildlife resources, whereas a Conservation Area may be established for its scenic, aesthetic or historic values. The establishment of Wildlife Management Areas throughout Papua New Guinea has led to the publication of a set of rules for the management of each area. As each area is established for a different purpose, each set of rules differs from all others.

The National Parks Act 1982 allows for the establishment, on state-owned or long-leased land, of a series of National Parks, protecting areas of outstanding scenic and scientific value.

The Crocodile Trade (Protection) Act 1974-1982 allows for the control of the crocodile industry on a systematic basis and provides Regulations promoting the conservation of crocodiles on a sustainable yield basis. There are thirteen regulations under this Act, dealing with control over buying, exporting, farming and licencing. The responsibility for enforcing these regulations lies with Rangers. For the purpose of this Act, any person appointed as a Ranger under the Fauna Protection Act is also a Ranger under the Crocodile Trade (Protection) Act.

The International Trade of Endangered Species of Fauna and Flora Act 1979 allows for the control on a cooperative basis of the export and import of certain wildlife species among countries which are signatories to the international agreement (CITES).

The Dumping of Wastes at Sea Act 1981 allows for the control of pollution of the seas surrounding Papua New Guinea. Dumping of Wastes at Sea Regulation 1980 deals principally with permits and fees; it also designates as Enforcement Officers the Principal Environmental Contaminants Officer, Department of Environment and Conservation, and the Marine Officer (Search and Rescue), Department of Transport and Civil Aviation.

The Environmental Contaminants Act 1978 allows for the control of a wide range of pollutants (including noise) which could be detrimental to the environment. Regulations are currently being drafted for gazetting under this Act.

The Environmental Planning Act 1978 allows for control over exploitation of environmental resources, and requires the preparation of an Environmental Impact Statement for projects which may have massive and long-term effects upon the quality of the environment after the project has finished. There are no regulations gazetted under this Act. A detailed set of Guidelines for developers has, however, been prepared by the Department of Environment and Conservation.

The Water Resources Act can regulate land drainage, river/stream channels (diversion and damming) and the disposal of wastes to land, swamps and watercourses and bodies. It encompasses both fresh and saline waters to the territorial boundaries of Papua New Guinea. It is empowered to declare Water Control Districts, which are specifically designed for the protection of public water supplies but could also be used to include environmental conservation.

Papua New Guinea is a signatory to the following international agreements with environment-conservation implications:

1. International Plant Protection Convention, Rome 1951.
2. International Convention for the Prevention of Pollution of the Sea by Oil, London 1954.
3. Plant Protection Agreement for the South East Asia and Pacific Region, Rome 1956.
4. International Convention on Civil Liability for Oil Pollution Damage, Brussels 1969.
5. International Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter, London, Mexico City and Moscow 1972.
6. International Convention on International Trade in Endangered Species of Wild Fauna and Flora, Washington 1973 (CITES).
7. International Convention on Conservation of Nature in the South Pacific, Apia 1976.
8. International Convention on the Prohibition of Military or any other Hostile Use of

Environmental Modification Techniques, New York 1976. 9. United Nations Convention on the Law of the Sea, Montego Bay 1982.

### **Wetland Area Administration**

The Department of Environment and Conservation is charged with the responsibility of protecting the natural habitats and conserving the wildlife of Papua New Guinea. However,

as most land is traditionally owned, the acquisition of land for conservation is difficult. The Office of Forests is responsible for timber resources including mangrove forests, and the Fisheries Division is responsible for all fish resources.

### **Organizations involved with Wetlands**

#### a) Governmental Organizations

- Department of Environment and Conservation  
Includes the Division of Water Resources, Division of Nature Conservation and Division of Environment.
- Department of Forestry  
Includes the Forest Products Research Centre in the National Capital District and the Division of Botany in Lae.
- Department of Fisheries  
Includes the Fisheries Research Institute, in Kanudi.
- Department of Agriculture and Livestock  
Includes the Aquatic Weed Control Unit in Wewak.
- Department of Lands and Physical Planning  
Includes the National Mapping Bureau.

#### b) Statutory Authorities

- University of Papua New Guinea  
Particularly the Biology Department.

#### c) Non-governmental Organizations

- Papua New Guinea Bird Society  
Based in the National Capital District.
- Christensen Research Institute  
Based in Madang.
- Wau Ecology Institute  
Based in Wau.

## WETLANDS

The site descriptions are adapted from a Draft Inventory of Wetlands in Papua New Guinea compiled for the Department of Environment and Conservation by Dr Patrick L. Osborne of the Biology Department, University of Papua New Guinea (Osborne, 1987). The principal contributors were Mr K. Kisokau, Mr G.R. Kula, Dr E. Lindgren, Mr W. Asigau, Mr I. Ila and Mr J. Dent of the Department of Environment and Conservation, Mr P. Lambley, Dr I. Burrows and Mr V. Bouauka of the University of Papua New Guinea, and Dr D. Coates of the Department of Fisheries and Marine Resources.

**Wetland name:** Sepik and Ramu Floodplains

**Country:** Papua New Guinea

**Coordinates:** Sepik River 4°10'S, 141°00'E to 3°50'S, 144°35'E; Ramu River 5°40'S, 145°30'E to 4°00'S, 144°35'E;

**Location:** from the Irian Jaya border in the west to the upper Ramu valley southwest of Madang in the east, West Sepik, East Sepik and Madang Provinces.

**Area:** Over 1,200,000 ha of floodplain wetlands, including Chambri Lake 21,600 ha.

**Altitude:** Sea level to 100m (mostly below 30m).

**Biogeographical Province:** 5.1.13.

**Wetland type:** 02, 07, 08, 11, 13, 14, 15, 18 & 21.

**Description of site:** The Sepik River is the largest river system in Papua New Guinea in terms of catchment area, although it has a lower discharge than the Fly River. The river is about 1,100 km long: it has a catchment area of 79,000 square kilometers, and is navigable for 500 km. The floodplain of the lower and middle Sepik and its tributaries varies from 30-70 km in width, and covers an area of about 780,000 ha. Most of the floodplain consists of wetlands which are inundated for at least five months of the year. The Ramu River is approximately 720 km long but has a small catchment area. In its lower reaches, the terrain is very flat and swampy, and the fall is imperceptible for a distance of 250 km near its mouth. In the flood season, the whole area near the mouths of the Sepik and Ramu Rivers (only 25 km apart) can become inundated.

There are about 1,500 oxbow and other lakes associated with the Sepik River floodplain, and a much smaller number associated with the Ramu. The largest of these is Chambri Lake, a shallow lake (maximum depth 4m) in a depression on the south bank of the Sepik in East Sepik Province (4°15'S, 143°05'E; 20m above sea level). This is the second largest lake in Papua New Guinea; at normal water levels, the area is about 21,600 ha, but during the flood season, it can increase to 25,000 ha. The lake is surrounded by floodplain grasslands. Most of the other lakes associated with the Sepik and Ramu Rivers are oxbows. Mitchell *et al.* (1980) recorded the following data for some lakes of the lower Sepik Area: surface temperatures 28.9-31.3°C, turbidity 12-25 JTU, Secchi disc readings 0.45-1.23m and pH 6.6-7.4. The limnology of the lower Sepik River and associated floodplain lakes has been described by Coates *et al.* (1983).

The main channel of the Sepik River is deep (over 35m at Angoram) and consequently so are the oxbow lakes in the lower floodplain, some of which are up to 40m deep. Mangrove areas associated with the river are negligible since the river discharges directly into the sea through a single outlet. Habitats are totally freshwater throughout the river length, and the fresh water can extend up to 35 km out to sea in the plume. This contrasts markedly with rivers in the south which invariably have extensive deltas and much larger estuarine zones. Modest mangrove areas occur to the west of the river mouth (around the Murik Lakes) and to the east (around the Watam Lakes). These are separate from the main river but subject to the influence of its flood regime.

**Climatic conditions:** The area generally has a humid tropical climate. Mean temperatures are around 30°C along the coast and slightly higher inland, and are uniform throughout the year. The mean annual rainfall is in the range 2,500-3,500 mm; the dry season is from May to October.

**Principal vegetation:** Mangrove swamps and stands of *Nypa fruticans* occur along the estuaries and around lakes in the delta area. The main mangrove species are *Rhizophora apiculata*, *Heritiera littoralis*, *Aegiceras corniculatum*, *Sonneratia caseolaris*, *Bruguiera gymnorrhiza*, *B. parviflora* and *Avicennia marina*. Strand woodland occurs along the beaches. Swamps account for over 130,000 ha, mainly on the broad floodplain of the Ramu River where there is a complex pattern of sago palm groves, herbaceous swamps and open lakes with aquatic plants. There is a dense growth of floating and trailing aquatic plants in the shallow lakes of the lower Sepik area, and Lake Chambri has abundant macrophytes and large floating grass islands. The aquatic vegetation of the lower Sepik River has been greatly altered by the introduction of *Salvinia molesta*. This weed covered large areas of the lakes in the middle and lower Sepik valley but biological control measures have been remarkably successful. In recent years, however, the area has been colonized by *Eichhornia crassipes*.

Freshwater plants recorded from West and East Sepik Provinces include the following: *Azolla pinnata*, *Stenochlaena milnei*, *S. palustris*, *Equisetum debile*, *Isoetes habbemensis*, *Nephrolepis biserrata*, *Ceratopteris thalictroides*, *Acrostichum aureum*, *Salvinia molesta*, *Ampelopteris prolifera*, *Cyclosorus interruptus*, *Acorus calamus*, *Lasia spinosa*, *Pistia stratiotes*, *Ceratophyllum demersum*, *Ipomoea aquatica*, *Cyperus cephalotes*, *C. platystylis*, *Eleocharis dulcis*, *E. retroflexa*, *Scirpus grossus*, *S. mucronatus ssp mucronatus*, *S. mucronatus ssp clemensii*, *Echinochloa praestans*, *Hymenachne acutigluma*, *Ischaemum polystachyum*, *Leersia hexandra*, *Oryza rufipogon*, *Panicum auritum*, *P. paludosum*, *Phragmites karka*, *Hanguana malayana*, *Hydrilla verticillata*, *Hydrocharis dubia*, *Pogostemon stellatus var roxburgianus*, *P. stellatus var stellatus*, *Aeschynomene indica*, *Spirodela polyrhiza*, *Utricularia aurea*, *U. exoleta*, *Nymphoides exiliflora*, *N. indica*, *Hydroscemma motleyi*, *Nelumbo nucifera*, *Nymphaea dictyophlebia*, *N. pubescens*, *Ludwigia adscendens*, *L. octovalvis*, *Polygonum attenuatum*, *P. minus*, *P. strigosum*, *Eichhornia crassipes*, *Monochoria hastata*, *M. vaginalis*, *Limnophila aromatica* and *L. indica*.

**Land tenure:** Mainly customary ownership.

**Conservation measures taken:** None, except for protection of the crocodiles.

**Conservation measures proposed:** None

**Land use:** Some arable land is used for the commercial cultivation of rubber, copra, coffee, cocoa, tea and other crops. The wetlands are used mainly for subsistence purposes. Subsistence fishing is considered important, especially on the floodplain. The only wetland plant that is heavily utilized is sago, which is harvested for subsistence purposes. There is a hydro-electric power scheme on the upper Ramu River close to where the river leaves the central highlands. This scheme is being extended to include a large man-made lake at Yonki.

**Disturbances and threats:** The recent spread of the aquatic weed *Salvinia molesta* in lakes and backwaters of the lower Sepik has been documented by Mitchell *et al.* (1980). This caused extensive disruption of social life, fishing, transport and food collecting. Biological control measures have proved successful, and the weed is no longer a serious problem (Room & Thomas, 1985). However, the presence, in low abundances at the moment, of the water hyacinth *Eichhornia crassipes* is now a major threat (Osborne & Leach, 1984).

**Economic and social values:** A very large number of people are dependent to some extent on the wetland resources of the Sepik and Ramu floodplains for their livelihood. In particular, the wetlands support important subsistence fisheries (Coates, 1985).

**Fauna:** The fish fauna of the lower Sepik River and associated floodplain lakes has been described by Coates (in press), and the floodplain fishery by Coates (1985). The rich fish fauna includes several introduced species such as Tilapia *Tilapia (Oreochromis) mossambica* (by far the most important component of fish catches) and the Common Carp *Cyprinus carpio*.

The region is known to be extremely important for a wide variety of waterfowl, but no quantitative data are available. The following species of waterfowl and other wetland birds have been recorded on the floodplains of the Sepik and Ramu Rivers: *Tachybaptus ruficollis*, *T. novaehollandiae*, *Pelecanus conspicillatus*, *Phalacrocorax sulcirostris*, *P. carbo*, *P. melanoleucos*, *Anhinga novaehollandiae*, *Ixobrychus sinensis*, *I. flavicollis*, *Nycticorax caledonicus*, *Butorides striatus*, *Egretta picata*, *E. garzetta*, *E. intermedia*, *E. alba*, *E. novaehollandiae*, *Ardea pacifica*, *A. sumatrana*, *Threskiornis molucca*, *Plegadis falcinellus*, *Platalea regia*, *Dendrocygna guttata*, *D. arcuata*, *Tadorna radjah*, *Nettapus coromandelianus*, *Anas gibberifrons*, *A. superciliosa*, *Aythya australis*, *Pandion haliaetus*, *Haliaeetus leucogaster*, *Grus rubicunda*, *Rallus pectoralis*, *R. philippensis*, *Eulabeornis plumbeiventris*, *Porzana cinerea*, *Amaurornis olivaceus*, *Megacrex inepta*, *Gallinula tenebrosa*, *Porphyrio porphyrio*, *Fulica aira*, *irediparra gallinacea*, *Himantopus leucocephalus*, *Vanellus miles*, *Pluvialis dominica*, *Charadrius dubius*, *Limosa limosa*, *L. lapponica*, *Numenius minutus*, *N. phaeopus*, *Tringa stagnatilis*, *T. glareola*, *Actitis hypoleucos*, *Heteroscelus brevipes*, *Gallinago hardwickii*, *G. megala*, *Calidris ruficollis*, *C. acuminata*, *Chlidonias hybrida*, *C. leucoptera*, *Gelochelidon nilotica*, *Sterna hirundo*, *S. albifrons* and *Eopsaltria pulverulenta*.

The area is also very important for both species of crocodiles, *Crocodylus porosus* and *C. novaeguineae*.

**Special floral values:** No information.

**Research and facilities:** A considerable amount of research has been carried out by the Department of Fisheries and Marine Resources research laboratories at Wewak and Angoram.

**References:** Chambers (1987); Coates (1985 & in press); Coates *et al.* (1983); CSIRO (1968 & 1976); Mitchell (1979); Mitchell *et al.* (1980); Osborne & Leach (1984); Roberts (1978); Room & Thomas (1985).

**Criteria for inclusion:** 123.

**Source:** D. Coates and P.L. Osborne.

**Wetland name:** Lake Wisdom

**Country:** Papua New Guinea

**Coordinates:** 5°12'-5°26'S, 147°00'-147°13'E;

**Location:** on Long Island, 55 km off the northeast coast of mainland PNG, Madang Province.

**Area:** 8,592 ha.

**Altitude:** 180m.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 14.

**Description of site:** Lake Wisdom is a freshwater caldera lake formed by the post-eruptive collapse of a volcanic peak. The lake fills the central crater of Long Island and is surrounded by steep crater walls rising to 1,280m. The water level shows annual fluctuations of approximately 1.0m. The lake has a maximum depth of 360m, and is thus one of the deepest lakes in the Southeast Asia/Australia region. Oxygen concentrations are generally high, with supersaturation down to 60m. High levels of oxygen have been found to at least 300m, and the presence of chironomids and molluscs at 360m indicates that the entire water body is oxygenated. This may be due to the active volcanic cone in the lake

heating up the surrounding water and thereby creating convection currents strong enough to keep the lake in circulation. pH values of 8.2-8.5 have been recorded.

**Climatic conditions:** Humid tropical climate with an average annual rainfall of approximately 2,800 mm.

**Principal vegetation:** There are no vascular aquatic plants in the lake. Elsewhere on the island, there is littoral forest at sea level and lowland and secondary forest at higher altitudes.

**Land tenure:** Customary ownership.

**Conservation measures taken:** The lake is included within the Ranba Wildlife Management Area (41,922 ha), established in June 1977.

**Conservation measures proposed:** Lindgren (1975) has proposed the establishment of a large conservation area surrounding and including Lake Wisdom.

**Land use:** None at the lake; subsistence and commercial logging in the Wildlife Management Area.

**Disturbances and threats:** None known at the lake; commercial logging in the Wildlife Management Area.

**Economic and social values:** The lake is of considerable limnological interest.

**Fauna:** There are no fishes in the lake. Ball and Glucksman (1978) found a simple benthic fauna consisting of one sponge, four molluscs, three ostracods, small numbers of Hemiptera, Odonata, Chironomidae, Ephemeroptera and Trichoptera, and one Lepidoptera. There is a low density of zooplankton, and only two planktonic crustaceans (Cladocera) have been recorded. The poor benthic and planktonic faunas have been attributed to the youth and isolation of the lake.

Ball & Glucksman (1978) also observed numerous Pacific Black Ducks *Anas superciliosa* and smaller numbers of Little Grebes *Tachybaptus ruficollis* on the lake.

The Wildlife Management Area supports a large population of Brown Cuscus *Phalanger orientalis*, which is heavily exploited at subsistence level. The island is also a breeding site for sea-turtles. Lindgren (1975) gives a preliminary list of the fauna of the Wildlife Management Area.

**Special floral values:** The plant communities were apparently totally destroyed by a volcanic eruption in the 1800s. The present forests represent re-colonization since then.

**Research and facilities:** Some basic limnological studies have been carried out at the lake.

**References:** Ball & Glucksman (1978); Bassot & Ball (1972); Chambers (1987); Lindgren (1975).

**Criteria for inclusion:** la.

**Source:** Gaikovina R. Kula and P.L. Osborne.

**Wetland name:** Markham Floodplain

**Country:** Papua New Guinea

**Coordinates:** 6°22'-6°25'S, 146°12'-146°58'E;

**Location:** west of Lae, Morobe Province.

**Area:** 196,400 ha of river channels.

**Altitude:** Sea level to 100m.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 11, 12, 13, 14, 15 & 18.

**Description of site:** The Markham River is only 170 km long but it is very wide and discharges a large volume of water. The braided river channel is three km wide at the Ramu Divide and reaches its maximum width of 22 km at its confluence with the Lerau River. It is not navigable because of its braided channels and fast flow. The catchment area is 12,000 sq.km. There are many small lakes and marshes on either side of the Markham Valley.

**Climatic conditions:** Humid tropical climate. The mean maximum temperature is 26-27°C, with the hottest time from November to February.

**Principal vegetation:** No information.

**Land tenure:** No information.

**Conservation measures taken:** None.

**Conservation measures proposed:** None

**Land use:** No information.

**Disturbances and threats:** No information.

**Economic and social values:** No information.

**Fauna:** An important area for a wide variety of waterfowl. The following wetland birds have been recorded from the Markham floodplain: *Tachybaptus ruficollis*, *T. novaehollandiae*, *Pelecanus conspicillatus*, *Phalacrocorax sulcirostris*, *P. melanoleucos*, *Anhinga novaehollandiae*, *Ixobrychus flavicollis*, *Nycticorax caledonicus*, *Egretta garzetta*, *E. intermedia*, *E. alba*, *E. novaehollandiae*, *Ardea pacifica*, *A. sumatrana*, *Dendrocygna guttata*, *D. arcuata*, *Anas gibberifrons*, *A. superciliosa*, *Pandion haliaetus*, *Haliaeetus leucogaster*, *Rallus pectoralis*, *R. philippensis*, *Eulabeornis plumbeiventris*, *Amaurornis olivaceus*, *Porphyrio porphyrio*, *Vanellus miles*, *Pluvialis dominica*, *Charadrius dubius*, *Limosa limosa*, *L. lapponica*, *Numenius phaeopus*, *N. madagascariensis*, *Tringa stagnatilis*, *Xenus cinereus*, *Actitis hypoleucos*, *Heteroscelus brevipes*, *Gallinago megala*, *Calidris acuminata*, *C. ferruginea*, *Limicola falcinellus*, *Sterna hirundo* and *S. albifrons*.

No information is available on the other fauna.

**Special floral values:** No information.

**Research and facilities:** None

**References:** None

**Criteria for inclusion:** 1b, 3b.

**Source:** P.L. Osborne and I. Burrows.

**Wetland name:** Lake Wanum

**Country:** Papua New Guinea

**Coordinates:** 6°38'S, 146°47'E;

**Location:** on the southern flank of the Markham Valley, near Oornsis, Morobe Province.

**Area:** 404 ha.

**Altitude:** 35m.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 14.

**Description of site:** A freshwater lake surrounded by low hills; the largest of a number of lakes in the area. The catchment area is small (800 ha), and there is no permanent inflow, the water supply coming largely from local rainfall. The very clear water is neutral-alkaline. The lake has a maximum depth of 19m, and is subject to small seasonal fluctuations in level.

**Climatic conditions:** Humid tropical climate with an average annual rainfall of 1,900 mm. There is little seasonal variation in rainfall although February/March and July/August are slightly wetter than other months.

**Principal vegetation:** Garret-Jones (1979) has recognized five aquatic plant communities: (a) a deep water floating root mat characterized by *Hypolytrum nemorum*, *Nephrolepis hirsutula* and *Stenochloena palustris*; (b) a shallow water association dominated by *H. nemorum*; (c) a mixed aquatic community with *Nelumbo nucifera* and *Nymphoides indica*; (d) a root mat association dominated by *Leersia hexandra*; (e) an open water community characterized by *N. nucifera*. *N. nucifera* and *Phragmites karka* form the dominant swamp vegetation, with *Eleocharis dulcis* on the outer edge. Other important aquatic plants include *Ceratophyllum demersum*, *Vallisneria natans* and *Najas graminea*.

Other freshwater plants recorded from Lake Wanum and the nearby Red Hill Swamp (site 5) include: *Chara fibrosa*, *Lychnothamnus barbatus*, *Nitella pseudoflabellata*, *Stenochlaena milnei*, *Nephrolepis radicans*, *Ceratopteris thalictroides*, *Microsorium schneideri*, *Acrostichum aureum*, *Cyclosorus interruptus*, *Caldesia parnassifolia*, *Colocasia esculenta*, *Cyperus platystylis*, *Scirpus grossus*, *S. mucronatus*, *Ischaemum polystachyum*, *Sacciolepis myosuroides*, *Blyxa aubertii*, *Hydrocharis dubia*, *Ottelia alismoides*, *Pogostemon stellatus*, *Aeschynomene indica*, *Lemna perpusilla*, *Utricularia bifida*, *Nymphaea macrosperma*, *Ludwigia hyssopifolia*, *L. octovalvis*, *Polygonum attenuatum*, *P. barbatum* and *Linnophila aromatica*.

**Land tenure:** Customary ownership.

**Conservation measures taken:** None.

**Conservation measures proposed:** None

**Land use:** There is a large chicken hatchery in the catchment area, and some subsistence fishing in the lake.

**Disturbances and threats:** *Tilapia mossambica* has been introduced into the lake.

**Economic and social values:** No information.

**Fauna:** The lake is important for the New Guinea Crocodile *Crocodylus novaeguineae*, and has an endemic rainbow fish *Glossolepis wanamensis*. No information is available on the waterfowl.

**Special floral values:** The wetland supports a diverse freshwater plant flora.

**Research and facilities:** None

**References:** Chambers (1987); Garrett-Jones (1979).

**Criteria for inclusion:** 1b, 2a, 2d.

**Source:** P.L. Osborne.

**Wetland name:** Red Hill Swamp

**Country:** Papua New Guinea

**Coordinates:** 6°38'S, 146°47'E;

**Location:** on the southern flank of the Markham Valley, near Oomsis, Morobe Province.

**Area:** 320 ha.

**Altitude:** 35m.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 15.

**Description of site:** An herbaceous swamp floating on 3m of water, with no areas of open water. The water is fresh and neutral-alkaline.

**Climatic conditions:** Humid tropical climate with an average annual rainfall of 1,900 mm. There is little seasonal variation in rainfall, although February/March and July/August are slightly wetter than other months.

**Principal vegetation:** *Nelumbo nucifera* and *Phragmites karka* form the dominant swamp vegetation, with *Eleocharis dulcis* on the outer edge. Other important aquatic plants include *Ceratophyllum demersum*, *Nymphoides indica*, *Vallisneria natans* and *Najas graminea*.

**Land tenure:** Customary ownership.

**Conservation measures taken:** None.

**Conservation measures proposed:** None

**Land use:** None.

**Disturbances and threats:** None known.

**Economic and social values:** No information.

**Fauna:** The swamp is important for the New Guinea Crocodile *Crocodylus novaeguineae*. No information is available on the waterfowl.

**Special floral values:** No information.

**Research and facilities:** None

**References:** Garrett-Jones (1979).

**Criteria for inclusion:** lb. 2a.

**Source:** P.L. Osborne.

**Wetland name:** Lake Yanamugi

**Country:** Papua New Guinea

**Coordinates:** 6°24'S, 146°17'E;

**Location:** one km northwest of Yatsing Village, on the southern margin of Markham River, Morobe Province.

**Area:** 350 ha.

**Altitude:** 170m.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 14.

**Description of site:** A small freshwater lake surrounded by lowland forest and tall grassland, and an associated swamp of about one hectare dominated by sago palms and *Phragmites* reeds. There are small seasonal fluctuations in water depth.

**Climatic conditions:** Tropical monsoonal climate with an average annual rainfall of 1,400 mm and a dry season from July to September.

**Principal vegetation:** *Eleocharis dulcis*, *Nymphaea pubescens* and *Nymphoides indica* occur in the littoral zone, and *Ceratophyllum demersum* and *Najas graminea* occur in open water areas of the lake. *Metroxylon sagu* and *Phragmites karka* are dominant in the swamp.

**Land tenure:** Customary ownership.

**Conservation measures taken:** None.

**Conservation measures proposed:** None

**Land use:** Some subsistence fishing and agriculture.

**Disturbances and threats:** None known.

**Economic and social values:** No information.

**Fauna:** No information.

**Special floral values:** No information.

**Research and facilities:** None

**References:** Garrett-Jones (1979).

**Criteria for inclusion:** l b.

**Source:** P.L. Osborne.

**Wetland name:** Mambare Wetland

**Country:** Papua New Guinea

**Coordinates:** 8°00'-8°30'S, 147°50'-148°10'E;

**Location:** along the Mambare River, south of Manau, Northern Province.

**Area:** 344,100 ha.

**Altitude:** Near sea level.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 02, 06, 07, 11, 13, 15 & 18.

**Description of site:** A vast area of riverine marshes and floodplain wetlands, including several small lakes, along the lower Mambare River, and extensive intertidal flats, mangrove swamps and numerous small tidal creeks in the delta. The river rises in the north end of the Owen Stanley Range and drains northeast into the Solomon Sea near Manau.

**Climatic conditions:** Tropical monsoonal climate.

**Principal vegetation:** Mangrove formations with a narrow zone of a *Cerriops tagal* association fronting the sea. The freshwater plants include: *Azolla pinnata*, *Equisetum debile*, *Ceratopteris thalictroides*, *Microsorium brassii*, *M. pteropus*, *Acrostichum aureum*,

*A. speciosum*, *Alternanthera sessilis*, *Pistia stratiotes*, *Callitriche palustris*, *Ceratophyllum demersum*, *Cyperus imbricatus*, *Eleocharis retroflexa*, *Scirpus crassiusculus*, *Hymenachne acutigluma*, *Phragmites karka*, *Sacciolepis myosuroides*, *Nymphoides indica*, *Nymphaea nouchali*, *Ludwigia octovalvis*, *Polygonum attenuatum*, *P. barbatum*, *P. minus*, *Monochoria hastata*, *Potamogeton sp*, *Limnophila aromatica*, *L. indica*, *Typha orientalis* and *Hydrocotyle sibthorpiodes*.

**Land tenure:** No information.

**Conservation measures taken:** None.

**Conservation measures proposed:** None

**Land use:** No information.

**Disturbances and threats:** No information.

**Economic and social values:** No information.

**Fauna:** An important area for a wide variety of water birds. The following species have been recorded: *Tachybaptus novaehollandiae*, *Pelecanus conspicillatus*, *Phalacrocorax sulcirostris*, *P. melanoleucos*, *Anhinga novaehollandiae*, *ixobrychus flavicollis*, *Nycticorax caledonicus*, *Butorides striatus*, *Egretta garzetta*, *E. intermedia*, *E. alba*, *Ardea sumatrana*, *Dendrocygna guttata*, *D. arcuata*, *Tadorna radjah*, *Anas superciliosa*, *Pandion haliaetus*, *Haliaeetus leucogaster*, *Rallus pectoralis*, *R. philippensis*, *Porzana cinerea*, *Amaurornis olivaceus*, *Porphyrio porphyrio*, *Vanellus miles*, *Pluvialis dominica*, *Charadrius dubius*, *Limosa limosa*, *Numenius minutus*, *N. phaeopus*, *Tringa stagnatilis*, *T. nebularia*, *T. glareola*, *Actitis hypoleucos*, *Heteroscelus brevipes*, *Calidris acuminata*, *C. melanotus*, *C. ferruginea*, *Limicola falcinellus*, *Sterna hirundo*, *S. albifrons* and *Pachycephala melanura*.

**Special floral values:** No information.

**Research and facilities:** None

**References:** Taylor (1957).

**Criteria for inclusion:** 1 b. 3b.

**Source:** P.L. Osborne and I. Burrows.

**Wetland name:** Musa Wetland

**Country:** Papua New Guinea

**Coordinates:** 9°03'-9°27'S, 148°38'-148°56'E;

**Location:** southwest of Gobe, Northern Province.

**Area:** 179,700 ha.

**Altitude:** Near sea level.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 02, 06, 07, 11, 13, 15 & 18.

**Description of site:** A vast area of floodplain wetlands including levees and back swamps along the lower Musa River, and a large area of intertidal flats, mangrove swamps and small tidal creeks near the river mouth in Dyke Ackland Bay.

**Climatic conditions:** Tropical monsoonal climate.

**Principal vegetation:** Mangrove formations with a narrow zone of a *Cerriops tagal* association fronting the sea, and small woodlands of *Nypa fruticans* near the river mouth. The freshwater plants of the floodplain wetlands include: *Azolla pinnata*, *Equisetum debile*, *Ceratopteris thalictroides*, *Microsorium brassii*, *M. pteropus*, *Acrostichum aureum*, *A. speciosum*, *Alternanthera sessilis*, *Pistia stratiotes*, *Callitriche palustris*, *Ceratophyllum demersum*, *Cyperus imbricatus*, *Eleocharis retroflexa*, *Scirpus crassiusculus*, *Hymenachne acutigluma*, *Phragmites karka*, *Sacciolepis myosuroides*, *Nymphoides indica*, *Nymphaea nouchali*, *Ludwigia octovalvis*, *Polygonum attenuatum*, *P. barbatum*, *P. minus*, *Monochoria hastata*, *Potamogeton sp*, *Limnophila aromatica*, *L. indica*, *Typha orientalis* and *Hydrocotyle sibthorpiodes*.

**Land tenure:** No information.

**Conservation measures taken:** None.

**Conservation measures proposed:** None

**Land use:** No information.

**Disturbances and threats:** No information.

**Economic and social values:** No information.

**Fauna:** An important area for a wide variety of water birds. The following species have been recorded: *Tachybaptus novaehollandiae*, *Phalacrocorax sulcirostris*, *P. melanoleucos*, *Anhinga novaehollandiae*, *Ixobrychus flavicollis*, *Nycticorax caledonicus*, *Egretta garzetta*, *E. intermedia*, *E. alba*, *Ardea sumatrana*, *Dendrocygna guttata*, *D. arcuata*, *Anas superciliosa*, *Pandion haliaetus*, *Haliaeetus leucogaster*, *Rallus pectoralis*, *R. philippensis*, *Porzana cinerea*, *Amaurornis olivaceus*, *Porphyrio porphyrio*, *Irediparra gallinacea*, *Vanellus miles*, *Pluvialis dominica*, *Charadrius dubius*, *Numenius phaeopus*, *Actitis hypoleucos*, *Heteroscelus brevipes*, *Calidris acuminata*, *Sterna hirundo*, *S. albifrons* and *Pachycephala melanura*.

No information is available on the other fauna.

**Special floral values:** No information.

**Research and facilities:** None

**References:** Taylor (1957).

**Criteria for inclusion:** 1b, 3b.

**Source:** P.L. Osborne and I. Burrows.

**Wetland name:** Lake Lavu

**Country:** Papua New Guinea

**Coordinates:** 9°31'S, 150°37'E;

**Location:** in the interior of Fergusson Island, 45 km off the eastern tip of the PNG mainland, Milne Bay Province.

**Area:** 264 ha.

**Altitude:** 0-40m.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 14.

**Description of site:** A small freshwater lake surrounded by lowland forest and tall grassland. The water is neutral-alkaline, and there are seasonal fluctuations in water depth.

**Climatic conditions:** Tropical monsoonal climate.

**Principal vegetation:** No information.

**Land tenure:** Customary ownership.

**Conservation measures taken:** The wetland was declared a Wildlife Management Area in 1981.

**Conservation measures proposed:** None

**Land use:** Subsistence fishing and agriculture.

**Disturbances and threats:** None known.

**Economic and social values:** No information.

**Fauna:** An important lake for fishes and the crocodiles *Crocodylus porosus* and *C. novaeguineae*.

**Special floral values:** No information.

**Research and facilities:** None

**References:** Lecroy *et al.* (1983).

**Criteria for inclusion:** 1b, 2a.

**Source:** Gaikovina R. Kula.

**Wetland name:** Sawataetae Wildlife Management Area

**Country:** Papua New Guinea

**Coordinates:** 9°57'S, 151°02'E;

**Location:** in north-central Normanby Island, off the eastern tip of the PNG mainland, Milne Bay Province.

**Area:** 700 ha.

**Altitude:** Near sea level; Wildlife Management Area to 120m.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 01, 07, 11, 15, 18 & 21.

**Description of site:** Mangrove swamps around a small bay on the north coast of Normanby Island, with seasonal slow-flowing streams, swampy areas, seasonally flooded grassland and swamp forest inland.

**Climatic conditions:** Tropical monsoonal climate.

**Principal vegetation:** Mangrove swamps.

**Land tenure:** Customary ownership.

**Conservation measures taken:** The wetland was declared a Wildlife Management Area in June 1977.

**Conservation measures proposed:** None

**Land use:** Some coconut plantations and subsistence farming.

**Disturbances and threats:** There is some disturbance from subsistence farming.

**Economic and social values:** No information.

**Fauna:** The wetland supports a small population of the Estuarine Crocodile *Crocodylus porosus*. Waterfowl include *Himantopus leucocephalus*, *Stiltia isabella*, *Esacus magnirostris*, *Pluvialis dominica*, *Charadrius dubius*, *C. mongolus* and *C. leschenaultii*. The area is important for the protection of three birds-of-paradise: *Manucodia comrii*, *M. keraudrenii* and *Paradisea decora*.

**Special floral values:** No information.

**Research and facilities:** None

**References:** Lecroy *et al.* (1983).

**Criteria for inclusion:** lb. 2a, 2b.

**Source:** Gaikovina R. Kula.

**Wetland name:** Rakua Wetland

**Country:** Papua New Guinea

**Coordinates:** 10°18'-10°24'S, 150°17'-150°23'E;

**Location:** at the west end of Mime Bay, near the southeastern extremity of the PNG mainland, Mime Bay Province.

**Area:** 59,000 ha.

**Altitude:** Near sea level.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 02, 05, 07, 12 & 15.

**Description of site:** A large area of forested alluvial plains with fast-flowing rivers. Along the coast and at the mouth of the Rakua River, there are mangrove swamps, low beach ridges with coastal successional vegetation, grassland and coconut groves.

**Climatic conditions:** Moist tropical climate with well-defined periods of high and low rainfall coinciding with seasonal alterations in the prevailing winds. The wettest part of the year occurs between November and April, and the driest time is from May to October.

**Principal vegetation:** The dominant mangrove species are *Heritiera littoralis*, *Xylocarpus* sp, *Bruguiera gymnorhiza*, *B. cylindrica*, *Rhizophora mucronata* and *R. apiculata*. *Ceriops tagal* and *Avicennia marina* also occur. The freshwater plants of Milne Bay Province are listed by Osborne (1987).

**Land tenure:** No information.

**Conservation measures taken:** None.

**Conservation measures proposed:** None

**Land use:** No information.

**Disturbances and threats:** No information.

**Economic and social values:** No information.

**Fauna:** The following wetland birds have been recorded at Rakua wetland: *Tachybaptus novaehollandiae*, *Phalacrocorax sulcirostris*, *P. melanoleucos*, *Anhinga novaehollandiae*, *Ixobrychus flavicollis*, *Nycticorax caledonicus*, *Egretta garzetta*, *E. intermedia*, *E. alba*, *E. novaehollandiae*, *Ardea sumatrana*, *Dendrocygna guttata*, *D. arcuata*, *Anas superciliosa*, *Pandion haliaetus*, *Haliaeetus leucogaster*, *Rallus pectoralis*, *R. philippensis*, *Porzana cinerea*, *Amaurornis olivaceus*, *Porphyrio porphyrio*, *Pluvialis dominica*, *Numenius minutus*, *N. phaeopus*, *Actitis hypoleucos*, *Heteroscelus brevipes*, *Calidris acuminata*, *Sterna hirundo*, *S. albifrons* and *Pachycephala melanura*. No information is available on the other fauna.

**Special floral values:** No information.

**Research and facilities:** None

**References:** Osborne (1987).

**Criteria for inclusion:** 1b, 3b.

**Source:** P.L. Osborne and I. Burrows.

**Wetland name:** Mullins Harbour Wetland

**Country:** Papua New Guinea

**Coordinates:** 10°23'-10°31'S, 149°53'-150°10'E;

**Location:** 30 km WSW of Mime Bay, Mime Bay Province.

**Area:** 127,700 ha.

**Altitude:** Near sea level.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 01, 02, 07, 11, 15 & 18.

**Description of site:** Mullins Harbour is a large, shallow sea bay surrounded by mangrove swamps and with a narrow entrance to the sea. There are extensive swamps, seasonal marshes and floodplain grasslands in the lowlands around the bay.

**Climatic conditions:** Moist tropical climate with well-defined periods of high and low rainfall coinciding with seasonal alterations in the prevailing winds. The wettest part of the year occurs between November and April, and the driest time is from May to October.

**Principal vegetation:** Mangrove swamps, and freshwater swamps and marshes. The freshwater plants of Milne Bay Province have been listed by Osborne (1987).

**Land tenure:** No information.

**Conservation measures taken:** None.

**Conservation measures proposed:** None

**Land use:** No information.

**Disturbances and threats:** No information.

**Economic and social values:** No information.

**Fauna:** The following wetland birds have been recorded at Mullins Harbour wetland: *Tachybaptus novaehollandiae*, *Pelecanus conspicillatus*, *Phalacrocorax sulcirostris*, *P. melanoleucos*, *Anhinga novaehollandiae*, *Ixobrychus flavicollis*, *Nycticorax caledonicus*, *Egretta picata*, *E. garzetta*, *E. intermedia*, *E. alba*, *Ardea sumatrana*, *Anas superciliosa*, *Pandion haliaetus*, *Haliaeetus leucogaster*, *Rallus pectoralis*, *R. philippensis*, *Porzana cinerea*, *Amaurornis olivaceus*, *Porphyrio porphyrio*, *Pluvialis dominica*, *Charadrius dubius*, *Numenius phaeopus*, *Xenus cinereus*, *Heteroscelus brevipes*, *Calidris ruficollis*, *C. acuminata*, *Sterna hirundo*, *S. albifrons*, *Halcyon chloris*, *Eopsaltria pulverulenta*, *Pachycephala melanura* and *Seleucidis melanoleuca*.

**Special floral values:** No information.

**Research and facilities:** None

**References:** Osborne (1987).

**Criteria for inclusion:** 1b, 3b.

**Source:** P.L. Osborne and I. Burrows.

**Wetland name:** Wetlands of Central Province

**Country:** Papua New Guinea

**Coordinates:** 8°30'S, 146°30'E to 10°15'S, 148°50'E;

**Location:** in the coastal lowlands of Central Province from the region of Malalaua in the north to Abau in the south. Lake Kumu wetlands 8°45'S, 146°35'E; Vanapa wetlands (near Port Moresby) 9°05'S, 146°57'E; Kemp Welch wetlands 10°03'S, 147°48'E; Mon wetlands 10°10'S, 148°45'E.

**Area:** Over 1,240,000 ha of wetlands: Lake Kumu area 350,000 ha; Vanapa 279,500; Kemp Welch 314,700 ha; Mon 300,000 ha.

**Altitude:** Near sea level.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 02, 05, 06, 07, 08, 11, 13, 14, 15, 18 & 21.

**Description of site:** Four large wetland areas, the Lake Kumu area, the Vanapa wetlands, the Kemp Welch wetlands and the Mon wetlands, in the coastal lowlands of Central Province. The Lake Kumu area (110 km northwest of Port Moresby) consists of the floodplain lakes and marshes of several rivers and the associated estuarine systems. Mangroves line the estuaries, and there are sago swamps further inland. The Vanapa wetlands extend from the Port Moresby area northwest for about 50 km, and include the lower regions and estuaries of the Vanapa, Brown, Laloki, Aroa, Kubuna and Kuriva rivers. Well-developed mangroves line most of the estuaries, particularly Galley Reach into which the Vanapa River flows. The Laloki River drains a large area of freshwater swamp, which includes the Waigani system. The Aroa River flows through swamp grasslands with areas of open water with the freshwater mangrove *Excoecaria agallocha*. The Kemp Welch wetlands (100 km southeast of Port Moresby) comprise the floodplain and estuarine marshes of the Kemp Welch River and coastal mangrove swamps to the east. The Mon wetlands (185 km southeast of Port Moresby) include the floodplain and estuarine marshes of the Mon River and the mangrove swamps lining the bay to the east. All the rivers rise in the Owen Stanley and Wharton Ranges of southeastern PNG.

Six of the most important sites in the Vanapa wetlands are described separately as sites 13a-13f.

**Climatic conditions:** Tropical monsoonal climate with an average annual rainfall of about 1,000 mm and a prolonged dry season from May to December.

**Principal vegetation:** There are 55,770 ha of mangrove forest in Central Province (including the National Capital District), and very large areas of fresh to brackish marshes, seasonally flooded grasslands and swamp forest. See sites 13a-13f.

**Land tenure:** Mainly customary ownership.

**Conservation measures taken:** None.

**Conservation measures proposed:** An area of 468 ha along the lower Kuriva River (9°05'S, 147°06'E) was proposed as a National Park in 1971. The site includes a stretch of slow-flowing river and associated marshes. The National Parks Board has an option to establish a National Park at Waigani Swamp (site 13a), and Lea Lea Salt Flats (site 13b) have been proposed as a Conservation Area.

**Land use:** Hunting, fishing, cattle ranching and subsistence farming in and around the wetlands; urban development at some of the wetlands around Port Moresby, and logging and reforestation in the Kuriva River area.

**Disturbances and threats:** Some threats have been reported at the Vanapa wetlands (see sites 13a-13f). No information is available for the other wetlands.

**Economic and social values:** The wetlands support a considerable amount of subsistence hunting and fishing, and provide valuable grazing land for domestic livestock during the prolonged dry season.

**Fauna:** The wetlands support large populations of a great diversity of waterfowl and other wetland birds. The area is particularly important as a dry season refuge for migrant waterfowl from Australia, and as a staging area for Palearctic shorebirds on their way to and from wintering areas in Australia. The following species are of regular occurrence: *Tachybaptus / novaehollandiae*, *Pelecanus conspicillatus*, *Phalacrocorax sulcirostris*, *P. carbo*, *P. melanoleucos*, *Anhinga novaehollandiae*, *Ixobrychus minutus*, *I. sinensis*, *I. flavicollis*, *Nycticorax caledonicus*, *Bubulcus ibis*, *Butorides striatus*, *Egretta picata*, *E. garzetta*, *E. intermedia*, *E. alba*, *E. novaehollandiae*, *Ardea pacifica*, *A. sumatrana*, *Threskiornis molucca*, *Carphibis spinicollis*, *Plegadis falcinellus*, *Platalea regia*, *Dendrocygna guttata*, *D. eytoni*, *D. arcuata*, *Tadorna radjah*, *Nettapus pulchellus*, *Anas gibberifrons*, *A. superciliosa*, *A. querquedula*, *Aythya australis*, *Pandion haliaetus*, *Haliaeetus leucogaster*, *Rallus pectoralis*, *R. philippensis*, *Porzana cinerea*, *P. tabuensis*, *P. pusilla*, *Amaurornis olivaceus*, *Gallinula tenebrosa*, *Porphyrio porphyrio*, *Fulica atra*, *Irediparra gallinacea*, *Himantopus leucocephalus*, *Vanellus miles*, *Pluvialis dominica*, *Charadrius dubius*, *C. cinctus*, *Limosa limosa*, *L. lapponica*, *Numenius minutus*, *N. phaeopus*, *N. madagascariensis*, *Tringa stagnatilis*, *T. nebularia*, *T. glareola*, *Xenus cinereus*, *Actitis hypoleucos*, *Heteroscelus brevipes*, *Gallinago hardwickii*, *G. megala*, *Calidris ruficollis*, *C. subminuta*, *C. acuminata*, *C. melanotos*, *C. ferruginea*, *Limicola falcinellus*, *Philomachus pugnax*, *Chlidonias hybrida*, *C. leucoptera*, *Gelochelidon nilotica*, *Hydroprogne caspia*, *Sterna hirundo*, *S. albifrons*, *Halcyon chloris*, *Gerygone levigaster*, *Rhiphidura phasiana*, *Eopsaltria pulverulenta*, *Pachycephala melanura* and *Seleucidis melanoleuca*.

**Special floral values:** No information.

**Research and facilities:** A considerable amount of research has been carried out at wetlands in the Port Moresby area, notably studies of the mangrove ecosystem, fisheries, freshwater plants and bird fauna.

**References:** Berra *et al.* (1975); Chambers (1987); CSIRO (1965); Frodin & Leach (1982); Neill (1946); Osborne & Leach (1983 & 1984); Osborne & Polunin (1986); Pajmans & Rollet (1977); Saulei (1978); Schuster (1975).

**Criteria for inclusion:** 123.

**Source:** Gaikovina R. Kula, P.L. Osborne and I. Burrows.

**Wetland name:** Waigani Swamp

**Country:** Papua New Guinea

**Coordinates:** 9°22'S, 147°10'E:

**Location:** 15 km north of Port Moresby, National Capital District.

**Area:** 120 ha.

**Altitude:** 5m.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 11, 13, 14 & 21.

**Description of site:** A complex of shallow, eutrophic, freshwater lakes and surrounding swamps associated with the Laloki River. The swamps are permanent but subject to marked fluctuations in water level, with high levels from January to April. The wetland is fed by local rainfall (December-April). The average depth is 1-2m; the water is neutral-alkaline. Low Secchi disc readings (0.07-0.76m) are due to large populations of phytoplankton. The

maximum surface temperature of the open water ranges from 24.6-33.0°C. High loadings of nitrate and total phosphorus in the lake support large populations of phytoplankton.

Over the past forty years, there has been a replacement of dominant emergent vegetation at Waigani Lake by floating-leaved aquatics and finally the loss of these to an open water system (Osborne & Leach, 1983). These changes were in part explained by nutrient enrichment over the period. In early 1984, the lake was covered for about two months in a dense growth of *Salvinia molesta* which subsequently declined rapidly to small peripheral patches.

**Climatic conditions:** Tropical monsoonal climate with an average annual rainfall of 1,000 mm and a prolonged dry season from May to December.

**Principal vegetation:** The swamp vegetation is dominated by *Phragmites karka* and *Typha orientalis*, with some *Ludwigia adscendens*, *Ipomoea aquatica* and *Hanguana malayana*. *Nymphoides indica*, *Ceratophyllum demersum* and *Nymphaea pubescens* are present in undisturbed lakes. *Salvinia molesta* is present but under biological control. Other aquatic plants include *Marsilea crenata*, *Ceratopteris thalictroides*, *Acrostichum aureum*, *Ampelopteris prolifera*, *Cyclosorus interruptus*, *Sagittaria platyphylla*, *Alternanthera sessilis*, *Pistia stratiotes*, *Cyperus platystylis*, *Eleocharis dulcis*, *Scirpus grossus*, *Hymenachne acutigluma*, *Ischaemum polystachyum*, *Leersia hexandra*, *Hydrocharis dubia*, *Spirodela polyrhiza*, *Najas indica*, *Nymphaea dictyophlebia*, *Ludwigia hyssopifolia*, *L. octovalvis*, *Polygonum barbatum* and *Monochoria hastata*.

**Land tenure:** Customary ownership.

**Conservation measures taken:** None.

**Conservation measures proposed:** The National Parks Board has an option to establish a Park.

**Land use:** Urban development and subsistence agriculture.

**Disturbances and threats:** Waigani Lake receives large quantities of untreated sewage effluent from the city of Port Moresby. This nutrient enrichment has caused major changes in the aquatic flora of the lake (Osborne & Leach, 1983; Osborne & Polunin, 1986). A fish kill of common carp and tilapia occurred in 1984. This appeared to be associated with low oxygen conditions induced by dense growths of *Salvinia molesta*.

**Economic and social values:** The lakes, particularly those close to Port Moresby, are heavily fished for the introduced tilapia *Tilapia mossambica*. Being close to a large urban area, the wetland has some potential for development as a National Park. The use of the wetland for sewage disposal has reduced its value in terms of its aquatic flora but has increased in value in terms of its avifauna.

**Fauna:** Both *Tilapia mossambica* and *Cyprinus carpio* have been introduced into the lake. Crocodiles are present but in very small numbers. The wetland supports a wide variety of water birds including many of those listed for the wetlands of Central Province as a whole (site 13). *Tachybaptus novaehollandiae*, *Egretta picata*, *Dendrocygna arcuata*, *Anas superciliosa*, *Gallinula tenebrosa*, *Porphyrio porphyrio*, *Irediparra gallinacea*, *Himantopus leucocephalus*, *Vanellus miles* and *Chlidonias hybrida* are particularly common.

**Special floral values:** None known.

**Research and facilities:** A considerable amount of research has been carried out on the ecology of the wetland. Research facilities are available at the University of Papua New Guinea in Port Moresby.

**References:** Chambers (1987); Neill (1946); Osborne & Leach (1983 & 1984); Osborne & Polunin (1986); Saulei (1978); Schuster (1975).

**Criteria for inclusion:** 1b, 3b.

**Source:** P.L. Osborne.

**Wetland name:** Lea Lea Salt Flats

**Country:** Papua New Guinea

**Coordinates:** 9°18'S, 146°59'E;

**Location:** about 30 km northwest of Port Moresby, Central Province.

**Area:** Unknown.

**Altitude:** 0-10m.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 05, 06 & 07.

**Description of site:** An area of intertidal sand and mud flats with a complex of mangrove swamps, salt flats and sandy beach ridges. Parts of the wetland are subject to seasonal flooding with brackish water.

**Climatic conditions:** Tropical monsoonal climate with a prolonged dry season from May to December. The mean monthly maximum temperatures range from 27-32°C, and the mean monthly minimum temperatures, from 22-24°C.

**Principal vegetation:** Tidal flats with mixed herbaceous cover; otherwise evergreen thicket and low and mid-height mangroves (species of *Avicennia*, *Sonneratia*, *Rhizophora* and *Bruguiera*) without ground cover. Some 48 plant species have been recorded including *Imperata cylindrica*, *Acacia auriculiformis*, *Pluchea indica*, *Acrostichum aureum*, *Chloris barbata*, *Avicennia marina*, *Sonneratia alba*, *Nypa fruticans*, *Sesuvium portulacastrum*, *Ceriops tagal*, *Sporobolus virginicus*, *Eriochloa procera*, *Tecticornia cinerea*, *Themeda novoguineensis* and *Themeda australis*.

**Land tenure:** Customary ownership.

**Conservation measures taken:** None.

**Conservation measures proposed:** The site has been proposed as a Conservation Area.

**Land use:** No information.

**Disturbances and threats:** A proposal has been made to develop a salt factory.

**Economic and social values:** No information.

**Fauna:** The wetland supports a wide variety of water birds, including many of those listed for the wetlands of Central Province as a whole (site 13), and is particularly important for migratory shorebirds.

**Special floral values:** No information.

**Research and facilities:** The site is close to Port Moresby where research facilities are readily available.

**References:** None

**Criteria for inclusion:** 1b, 3b.

**Source:** Gaikovina R. Kula.

**Wetland name:** Lake Iaraguma

**Country:** Papua New Guinea

**Coordinates:** 9°16'S, 147°02'E;

**Location:** about 28 km northwest of Port Moresby, Central Province.

**Area:** Lake area 200 ha, but part of a much bigger wetland.

**Altitude:** Near sea level.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 07, 09 & 14.

**Description of site:** Three shallow freshwater lakes which sometimes unite to form a single large lake, on the flood plain of the Laloki and Brown Rivers. The lakes form part of a much larger wetland complex. The wetland is bordered to the west by *Eucalyptus* savanna. The three lagoons are of different depths. One is almost permanent; the second generally tends to dry out in November, whilst the third generally dries out in September or October. There are some mangrove swamps and saltpans in the area.

**Climatic conditions:** Tropical monsoonal climate with a wet season from December to April.

**Principal vegetation:** Areas of open water with extensive beds of floating and floating-leaved plants, bordered by swamp vegetation with *Phragmites karka*. The dominant aquatic plants include *Pistia stratiotes*, *Ceratophyllum demersum*, *Ipomoea aquatica*, *Eleocharis dulcis*, *Nymphoides indica*, *Nymphaea pubescens*, *Hydrilla verticillata*, *Hydrocharis dubia*, *Utricularia aurea*, *Nymphaea nouchali* and *Typha orientalis*. To the west, there is savanna grassland with *Eucalyptus* spp.

**Land tenure:** Customary ownership.

**Conservation measures taken:** None.

**Conservation measures proposed:** None

**Land use:** Fishing, hunting and some cattle ranching.

**Disturbances and threats:** Nothing significant.

**Economic and social values;** Fishing and hunting.

**Fauna:** Of considerable importance for resident waterfowl, and in most years also important for migratory shorebirds. When conditions are suitable, the lagoons can support up to 2,000 Palearctic shorebirds. A wide variety of water birds has been recorded, including *Tachybaptus novaehollandiae*, *Pelecanus conspicillatus*, *Phalacrocorax sulcirostris*, *P. melanoleucos*, *Anhinga novaehollandiae*, *Nycticorax caledonicus*, *Bubulcus ibis*, *Egretta picata*, *E. intermedia*, *E. alba*, *E. novaehollandiae*, *Threskiornis molucca*, *Plegadis falcinellus*, *Platalea regia*, *Dendrocygna guttata*, *D. arcuata*, *Nettapus puichellus*, *Anas gibberifrons*, *A. superciliosa*, *Gallinula tenebrosa*, *Porphyrio porphyrio*, *Irediparra gallinacea*, *Vanellus miles*, *Pluvialis dominica*, *Charadrius mongolus*, *Limosa limosa*, *L. lapponica*, *Numenius minutus*, *Tringa stagnatilis*, *T. nebularia*, *T. glareola*, *Xenus cinereus*, *Actitis hypoleucos*, *Calidris ruficollis*, *C. subminuta*, *C. acuminata*, *C. melanotos* and *C. ferruginea*.

**Special floral values:** The wetland supports a good range of lowland tropical wetland plants.

**Research and facilities:** A considerable amount of ornithological work has been carried out, and this has been summarized in the Newsletters of the Papua New Guinea Bird Society. Full laboratory facilities are available at the University of Papua New Guinea in Port Moresby.

**References:** None

**Criteria for inclusion:** lb. 3b.

**Source:** Peter Lambley.

**Wetland name:** Kanosia Lagoon

**Country:** Papua New Guinea

**Coordinates:** 9°01'S, 146°54'E;

**Location:** about 55 km northwest of Port Moresby, Central Province.

**Area:** 30 ha.

**Altitude:** Near sea level.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 14.

**Description of site:** A shallow freshwater lagoon and associated marshes situated in a shallow bowl-shaped depression in heavily grazed grassland. The lagoon fills in the wet season (December-April) and dries out during the dry season, generally well before the nearby Hisiu and Aroa Lagoons.

**Climatic conditions:** Tropical monsoonal climate with a wet season from December to April.

**Principal vegetation:** Swamps dominated by *Polygonum minus*, with *Leersia hexandra* and *Phragmites karka*; grasslands grazed by cattle in surrounding areas.

**Land tenure:** Customary ownership.

**Conservation measures taken:** None.

**Conservation measures proposed:** None

**Land use:** Cattle ranching.

**Disturbances and threats:** None known.

**Economic and social values:** Cattle ranching.

**Fauna:** A very important area for waterfowl, complementary to Aroa and Hisiu Lagoons (sites 13e & 13f), although it tends to dry out earlier. Water birds recorded include *Tachybaptus novaehollandiae*, *Pelecanus conspicillatus*, *Phalacrocorax sulcirostris*, *P. melanoleucos*, *Anhinga novaehollandiae*, *Nycticorax caledonicus*, *Bubulcus ibis*, *Egretta picata*, *E. garzetta*, *E. intermedia*, *E. alba*, *E. novaehollandiae*, *Ardea pacifica*, *Threskiornis molucca*, *Plegadis falcinellus*, *Dendrocygna guttata*, *D. arcuata*, *Nettapus puichellus*, *Anas gibberifrons*, *A. superciliosa*, *A. querquedula*, *Aythya australis*, *Circus (aeruginosus) spilonotus*, *C. approximans*, *Falco peregrinus*, *Porzana cinerea*, *P. pusilla*, *Gallinula tenebrosa*, *Porphyrio porphyrio*, *Fulica atra*, *Himantopus leucocephalus*, *Stiltia isabella*, *Vanellus miles*, *Pluvialis dominica*, *Charadrius dubius*, *C. cinctus*, *C. mongolus*, *Limosa limosa*, *Numenius minutus*, *Tringa stagnatilis*, *Gallinago hardwickii*, *Calidris ruficollis*, *C. acuminata*, *C. melanotos*, *C. ferruginea*, *Chlidonias hybrida*, *C. leucoptera* and *Gelochelidon nilotica*.

**Special floral values:** None known.

**Research and facilities:** The Papua New Guinea Bird Society has conducted a number of ornithological surveys of the area. Full laboratory facilities are available at the University of Papua New Guinea in Port Moresby.

**References:** None

**Criteria for inclusion:** 1b, 3b.

**Source:** Peter Lambley.

**Wetland name:** Aroa Lagoon

**Country:** Papua New Guinea

**Coordinates:** 9°01'S, 146°47'E;

**Location:** about 65 km northwest of Port Moresby, Central Province.

**Area:** 150 ha.

**Altitude:** Near sea level.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 14.

**Description of site:** A large freshwater lagoon set in *Eucalyptus* and *Melaleuca* savanna, about 4 km from the coast; the largest freshwater lagoon in the area. The lagoon fills in the wet season (December-April) and slowly dries out during the dry season. Depending on the year, large areas of mud are often exposed towards the end of the dry season, in September, October and November.

**Climatic conditions:** Tropical monsoonal climate with a wet season from December to April.

**Principal vegetation:** Swamp vegetation merging into savanna grassland, with a large area of freshwater mangroves (*Excoecaria agallocha*) on the northern side. The swamp vegetation includes *Eleocharis dulcis*, *Nymphoides indica*, *Nymphaea pubescens* and *Typha orientalis*.

**Land tenure:** Customary ownership.

**Conservation measures taken:** None.

**Conservation measures proposed:** None

**Land use:** Fishing and hunting; some gardening in the adjacent areas of savanna.

**Disturbances and threats:** Occasional disturbance through hunting and fishing.

**Economic and social values:** Hunting and fishing.

**Fauna:** The lagoon is very important both for resident waterfowl and migratory shorebirds. In the dry season, the lagoon supports very large numbers of *Phalacrocorax sulcirostris*, *Egretta* spp, *Dendrocygna guttatus*, *D. arcuata* and *Nettapus pulchellus*. At the end of the dry season, it can attract considerable numbers of shorebirds if large areas of wet mud are exposed. Water birds recorded include the following: *Tachybaptus novaehollandiae*, *Pelecanus conspicillatus*, *Phalacrocorax sulcirostris*, *P. melanoleucos*, *Anhinga novaehollandiae*, *Butorides striatus*, *Nycticorax caledonicus*, *Egretta picata*, *E. garzetta*, *E. intermedia*, *E. alba*, *Dendrocygna guttata*, *D. arcuata*, *Tadorna radjah*, *Nettapus pulchellus*, *Anas gibberifrons*, *A. superciliosa*, *A. querquedula*, *Porzana cinerea*, *P. tabuensis*, *Gallinula tenebrosa*, *Fulica atra*, *Irediparra gallinacea*, *Stiltia isabella*, *Vanellus miles*, *Charadrius dubius*, *Tringa stagnatilis*, *T. glareola*, *Xenus cinereus*, *Actitis hypoleucos*, *Limnodromus semipalmatus*, *Calidris ruficollis*, *C. subminuta*, *C. acuminata*, *C. ferruginea*, *Chlidonias hybrida*, *C. leucoptera* and *Gelochelidon nilotica*. The harrier *Circus (aeruginosus) spilonotus* is fairly common, and *Falco peregrinus* has been recorded. The Agile Wallaby *Macropus agilis* occurs in the area.

**Special floral values:** None known.

**Research and facilities:** The Papua New Guinea Bird Society has conducted a number of ornithological surveys of the area. Full laboratory facilities are available at the University of Papua New Guinea in Port Moresby.

**References:** None

**Criteria for inclusion:** 1b, 3b.

**Source:** Peter Lambley.

**Wetland name:** Hisiu Lagoon

**Country:** Papua New Guinea

**Coordinates:** 9°02'S, 146°45'E;

**Location:** about 65 km northwest of Port Moresby, Central Province.

**Area:** 50 ha.

**Altitude:** Near sea level.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 14.

**Description of site:** A shallow freshwater lagoon and associated marshes situated in savanna with relatively poor drainage, about 2 km from the coast. The lagoon usually fills up during the wet season (December-April), then slowly dries out during the dry season. Depending on the year, large areas of mud are often exposed towards the end of the dry season, in September, October and November.

**Climatic conditions:** Tropical monsoonal climate with a wet season from December to April.

**Principal vegetation:** Dominant aquatic plants include *Ceratopteris thalictroides*, *Alternanthera sessilis*, *Ceratophyllum demersum*, *Ipomoea aquatica*, *Scirpus articulatus*, *Echinochloa praestans*, *Sesbania javanica*, *Nymphoides indica* and *Nymphaea pubescens*. The wetland is surrounded by savanna grassland with scattered shrubs and *Pandanus*, and there are coconut plantations in the vicinity.

**Land tenure:** Customary ownership.

**Conservation measures taken:** None.

**Conservation measures proposed:** None

**Land use:** Fishing and hunting.

**Disturbances and threats:** Occasional disturbance from hunting and fishing activities.

**Economic and social values:** Hunting and fishing.

**Fauna:** The lagoon is a very important area for *Phalacrocorax sulcirostris*, egrets, ducks and terns during the wet season, and can hold large numbers of migratory shorebirds towards the end of the dry season (September-November), if water levels are suitable. In good years, up to 6,000 shorebirds have been counted at one time. These include several species more usually associated with coastal habitats. A number of unusual species for Papua New Guinea have been found here in recent years. Water birds recorded at the lagoon include: *Phalacrocorax sulcirostris*, *P. melanoleucos*, *Anhinga novaehollandiae*, *Egretta picata*, *E. garzetta*, *E. intermedia*, *E. alba*, *Threskiornis molucca*, *Plegadis falcinellus*, *Platalea regia*, *Dendrocygna guttata*, *D. arcuata*, *Tadorna radjah*, *Anas gibberifrons*, *A. querquedula*, *Circus approximans*, *Irediparra gallinacea*, *Himantopus leucocephalus*, *Vanellus miles*, *Pluvialis dominica*, *Charadrius cinctus*, *C. mongolus*, *C. leschenaultii*, *Limosa limosa*, *L. lapponica*, *Numenius minutus*, *N. phaeopus*, *N. madagascariensis*, *Tringa stagnatilis*, *T. nebularia*, *T. glareola*, *Actitis hypoleucos*, *Gallinago hardwickii*, *Calidris ruficollis*, *C. subminuta*, *C. acuminata*, *C. melanotos*, *C. ferruginea*, *Limicola falcinellus*, *Philomachus pugnax*, *Chlidonias hybrida*, *C. leucoptera* and *Gelochelidon nilotica*.

**Special floral values:** None known.

**Research and facilities:** The Papua New Guinea Bird Society has conducted a number of ornithological surveys of the area. Full laboratory facilities are available at the University of Papua New Guinea in Port Moresby.

**References:** None

**Criteria for inclusion:** lb. 3b.

**Source:** Peter Lambley.

**Wetland name:** The Kikori Wetlands and the Purari River

**Country:** Papua New Guinea

**Coordinates:** 7°00'-7°50'S, 143°10'-145°30'E;

**Location:** the coastal lowlands of Gulf Province from the mouth of the Turama River to the delta of the Purari River on Deception Bay, Gulf Province.

**Area:** 1,331,300 ha.

**Altitude:** Near sea level.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 02, 05, 06, 07, 11, 13, 15, 18 & 21.

**Description of site:** The Kikori and Purari wetlands comprise an area of over 13,000 sq.km of intertidal mudflats, tidal creeks, mangrove swamps, freshwater swamps, floodplain wetlands and swamp forests in the delta systems of the Purari, Kikori and Turama rivers and many smaller rivers and streams. The wetlands extend for some 150 km along the shores of Deception Bay on the Gulf of Papua. The Purari River is 600 km long and has an extensive delta at its outflow into the Gulf. There are 134,000 ha of mangroves in the Purari Delta, and perhaps as much as 200,000 ha of mangroves in the gulf area as a whole. One of the richest areas in the Kikori system is at Niru (7°26'S, 144°21'E; 1,200 ha). Here, mangroves and swamp forests surround a small hill (323m) covered in lowland rainforest. The tidal variation is 1-2m.

**Climatic conditions:** Most of the area has a wet tropical climate, but in the southeast there is a transitional zone grading to a sub-humid tropical climate. The mean annual rainfall ranges from 3,100 to 3,550 mm. The mean annual temperature is WC with little variation throughout the year.

**Principal vegetation:** The main vegetation types include littoral woodland, mangroves (*Rhizophora* and *Bruguiera* on tidal flats, *Avicennia marina* on inner tidal flats, *Nypa fruticans* on tidal flats subject to daily flooding with brackish water, and mixed mangrove woodland in brackish areas along the coast), freshwater swamps with herbaceous

vegetation, sago palms (*Metroxylon sagu*), swamp forest with *Melaleuca leucadendron*, and *Camptosperma* swamp forest.

**Land tenure:** Mainly customary ownership.

**Conservation measures taken:** None.

**Conservation measures proposed:** The establishment of a wildlife management area (1,200 ha) has been proposed at Niru.

**Land use:** Hunting, fishing and subsistence farming. There is a Mission Station in the Niru area.

Possible changes In Land use: A hydro-electric scheme has been considered for the Purari River, with a dam at Wabo.

**Disturbances and threats:** Mineral exploration in the Niru area. There is a considerable amount of crocodile hunting for skins and meat.

**Economic and social values:** No information.

**Fauna:** A very important area for a wide variety of water birds. Species known to occur include: *Tachybaptus novaehollandiae*, *Pelecanus conspicillatus*, *Phalacrocorax sulcirostris*, *P. carbo*, *P. melanoleucos*, *Anhinga novaehollandiae*, *Ixobrychus flavicollis*, *Nycticorax caledonicus*, *Butorides striatus*, *Egretta picata*, *E. garzetta*, *E. intermedia*, *E. alba*, *E. novaehollandiae*, *Ardea pacifica*, *A. sumatrana*, *Threskiornis molucca*, *Carphibis spinicollis*, *Plegadis falcinellus*, *Platalea regia*, *Dendrocygna guttata*, *D. arcuata*, *Tadorna radjah*, *Nettapus puichellus*, *Anas superciliosa*, *Pandion haliaetus*, *Haliaeetus leucogaster*, *Rallus pectoralis*, *R. philippensis*, *Porzana cinerea*, *Amaurornis olivaceus*, *Gallinula tenebrosa*, *Porphyrio porphyrio*, *Irediparra gallinacea*, *Himantopus leucocephalus*, *Vanellus miles*, *Pluvialis dominica*, *Limosa limosa*, *L. lapponica*, *Numenius minutus*, *N. phaeopus*, *N. madagascariensis*, *Tringa glareola*, *Xenus cinereus*, *Actitis hypoleucos*, *Heteroscelus brevipes*, *Calidris acuminata*, *C. melanotos*, *Chlidonias hybrida*, *Gelochelidon nilotica*, *Sterna hirundo*, *S. albifrons*, *Halcyon chloris*, *Gerygone levigaster*, *Rhiphidura phasiana*, *Eopsaltria pulverulenta*, *Pachycephala melanura* and *Seleucidis melanoleuca*.

A total of 140 species of fishes from 57 families has been recorded in the Purari and Kikori mangroves, along with four species of amphibians, 20 species of reptiles and 12 species of mammals. Both the Estuarine Crocodile *Crocodylus porosus* and the New Guinea Freshwater Crocodile *C. novaeguineae* occur in significant numbers throughout the region. The Niru area, in particular, is noted for its crocodiles.

**Special floral values:** No information.

**Research and facilities:** A considerable amount of research has been carried out on the wetland ecosystems, including studies on the flora, mangrove communities, zooplankton, fishes, crocodiles and birds.

**References:** Ashford (1979); Bayly (1980); Bayly & Morton (1980); Conn (1983); Floyd (1977); Haig & Burgin (1982); Haines (1979 & 1983); Liem & Haines (1977); Pernetta & Burgin (1980); Petr (1980 & 1983); Petr & Lucero (1979); Spencely (1981).

**Criteria for inclusion:** 123.

**Source:** Gaikovina R. Kula, P.L. Osborne and I. Burrows.

**Wetland name:** Fly River Floodplain

**Country:** Papua New Guinea

**Coordinates:** 5°40'S, 141°00'E to 8°40'S, 143°50'E;

**Location:** from the region of Kiunga near the foothills of the Victor Emanuel Range on the Irian Jaya border, south to the Fly River Delta in the Gulf of Papua, Western Province.

**Area:** c.4,500,000 ha.

**Altitude:** 0-20m.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 02, 06, 07, 08, 11, 12, 14, 15, 18 & 21.

**Description of site:** The vast floodplain and delta system of the Fly River, its main tributary the Strickland River, and many smaller tributary rivers and streams. The Fly River is the largest river in Papua New Guinea on discharge, and ranks with the largest in the world. It is over 1,200 km long and is navigable as far as Kiunga, 800 km from its mouth. The gradient in

its lower course is extremely gentle as Kiunga is only 20m above sea level. The river is tidal for 240 km upstream. The system contains numerous small oxbow lakes and many large lateral lakes, such as Lake Murray, Boset Lagoon and Lake Daviumbu (described separately as sites 15a, 15b and 15c), and the Khanda, Nangamange and Szaga complex (7,840 ha) on the east bank of the Fly. The delta area contains many low-lying islands, extensive mangrove swamps and numerous tidal creeks.

The soils of the Fly region are acidic histosols and fluvisols, and therefore the lakes associated with them may also tend towards low pH. The flow of the Fly River averages 7,000 cubic meters per second; the pH is 6.8-7.8, and the turbidity 5-105 JTU.

**Climatic conditions:** Tropical monsoonal climate, with a wet season from December to March or April and a dry season from April to November. The average annual rainfall in the middle Fly region is about 2,300-2,500 mm.

**Principal vegetation:** Mangrove swamps; swampy grasslands of *Echinochloa stagnina*, *Leersia hexandra* and *Ischaemum polystachyum*. Wild rice *Oryza sativa* is believed to play an important role in the shallow lakes of the Fly region; it helps to keep the water cool, increases oxygen levels, and provides shelter and food for fishes.

**Land tenure:** Mainly customary ownership.

**Conservation measures taken:** None.

**Conservation measures proposed:** None

**Land use:** Fishing (mainly subsistence but some commercial), especially for Barramundi *Lates calcarifer*; also deer hunting, crocodile hunting, some crocodile farming, the harvesting of sago, and subsistence farming.

**Disturbances and threats:** No information.

**Economic and social values:** Fishing, hunting and transportation.

**Fauna:** The Barramundi *Lates calcarifer* is common throughout the swamps, lakes and river channels in the middle Fly region. This is the most important freshwater fish in Papua New Guinea, supporting a commercial fishery of 290 metric tonnes per year.

The whole Fly region is extremely important for a wide variety of water birds. Species known to occur include: *Tachybaptus novaehollandiae*, *Pelecanus conspicillatus*, *Phalacrocorax sulcirostris*, *P. carbo*, *P. melanoleucos*, *Anhinga novaehollandiae*, *Ixobrychus flavicollis*, *Nycticorax caledonicus*, *Butorides striatus*, *Egretta picata*, *E. garzetta*, *E. intermedia*, *E. alba*, *E. novaehollandiae*, *Ardea sumatrana*, *Ephippiorhynchus asiaticus*, *Threskiornis molucca*, *Carphibis spinicollis*, *Plegadis falcinellus*, *Platalea regia*, *Anseranas semipalmata*, *Dendrocygna guttata*, *D. eytoni*, *D. arcuata*, *Tadorna radjah*, *Nettapus puichellus*, *Anas gibberifrons*, *A. superciliosa*, *A. querquedula*, *Pandion haliaetus*, *Haliaeetus leucogaster*, *Grus rubicunda*, *Rallus pectoralis*, *R. philippensis*, *Porzana cinerea*, *Amaurornis olivaceus*, *Megacrex inepta*, *Gallinula tenebrosa*, *Irediparra gallinacea*, *Himantopus leucocephalus*, *Vanellus miles*, *Pluvialis dominica*, *Numenius minutus*, *N. phaeopus*, *N. madagascariensis*, *Tringa nebularia*, *Xenus cinereus*, *Actitis hypoleucos*, *Heteroscelus brevipes*, *Calidris ruficollis*, *C. acuminata*, *Chlidonias hybrida*, *C. leucoptera*, *Gelochelidon nilotica*, *Hydroprogne caspia*, *Sterna hirundo*, *S. albifrons*, *Halcyon chioris*, *Gerygone levigaster*, *Rhiphidura phasiana*, *Eopsaltria pulverulenta*, *Pachycephala melanura* and *Seleucidis melanoleuca*. The Fly River Grassbird *Megalurus albolimbatus* is endemic to the region.

The floodplains support large populations of the introduced Rusa Deer *Cervus timorensis*. The Estuarine Crocodile *Crocodylus porosus* and New Guinea Freshwater Crocodile *C.*

*novaeguineae* are both widespread and relatively common. The freshwater crayfish *Cherax albertisii* and the prawn *Macrobrachium rosenbergi* occur throughout the shallow lakes.

**Special floral values:** No information.

**Research and facilities:** A considerable amount of basic fauna! and floral research has been carried out in the region, and a detailed study has been made of Barramundi population biology.

**References:** Brass (1938); Chambers (1987); CSIRO (1971); Dunstan (1962); Moore (1982); Moore & Reynolds (1982).

**Criteria for inclusion:** 123.

**Source:** P.L. Osborne and I. Burrows.

**Wetland name:** Lake Murray

**Country:** Papua New Guinea

**Coordinates:** 6°40'-7°15'S, 141°15'-141°45'E;

**Location:** between the Fly and the Strickland Rivers, 65 km SSE of Kiunga, Western Province.

**Area:** 64,700 ha.

**Altitude:** 20m.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 14, 18 & 21.

**Description of site:** Lake Murray, with an area of 64,700 ha, is the largest lake in Papua New Guinea and the largest freshwater lake in the whole of Australasia. The lake lies in a shallow depression between the Strickland and Fly Rivers, and has a maximum depth of only 7-10m. It is a lateral lake, formed by the blocking of a tributary of the Strickland River. It has a very dendritic outline giving it a very long shoreline (2,038 km). The lake forms part of an enormous wetland and is drained by the Herbert River which flows into the Strickland River. The water catchment area is relatively small (250,000 ha), and the lake exhibits marked seasonal fluctuations in water level, with levels falling between April and December. During the period of low water (November-January), vast areas of barren mud are exposed, and in drought years, the lake has been known to dry out completely. At low water levels, the water is very turbid and the submerged and littoral vegetation is poorly developed. Following the rains, the lake fills and becomes less turbid, and a diverse aquatic vegetation develops. The water is fresh with a conductivity of 12-110 microSeimens/cm and a pH of 5.2-6.5. Surface temperatures of 27-32°C have been recorded.

**Climatic conditions:** Tropical monsoonal climate with a wet season from December to March or April and a dry season from April to November. The average annual rainfall is about 2,300 mm.

**Principal vegetation:** The aquatic vegetation consists of two zones: an outer zone dominated by *Nymphoides indica* with some *Nymphaea nouchali*, *Ceratophyllum demersum* and *Blyxa novoguineensis*, and an inner zone of hydrophytic grasses with *Spomoea aquatica*, *Azolla pinnata* and *Utricularia* sp. *Limnophila indica* occurs on newly exposed mud and in shallow water. The surrounding swampy grassland is dominated by *Echinochloa stagnina*, *Leersia hexandra* and *Ischaemum polystachyum*. Other aquatic plants include *Stenochlaena palustris*, *Pistia stratiotes*, *Echinochloa praestans*, *Ludwigia adscendens*, *Polygonum attenuatum* and *P. orientale*. Because of the marked seasonal fluctuations in water level, plant development along the shoreline is seasonal. The lake is situated in a region of lowland rain forest.

**Land tenure:** Customary ownership.

**Conservation measures taken:** None.

**Conservation measures proposed:** None

**Land use:** Fishing, deer hunting, sago harvesting, subsistence farming and crocodile farming. The catchment area is largely undeveloped, and supports a local population of about 1,500 people (1980 census). Cash crops include rubber, crocodile skins and Barramundi (*Lates calcarifer*).

**Disturbances and threats:** Kyle and Ghani (1982) reported contamination of fishes with mercury from an unknown source.

**Economic and social values:** No information.

**Fauna:** The wetland supports a great diversity of waterfowl (see site 15), as well as large populations of the introduced Rusa Deer *Cervus timorensis* and crocodiles.

**Special floral values:** The lake supports a very diverse aquatic flora.

**Research and facilities:** None

**References:** Chambers (1987); Kyle & Ghani (1982); Osborne *et al.* (1987).

**Criteria for inclusion:** 123.

**Source:** P.L. Osborne.

**Wetland name:** Boset Lagoon

**Country:** Papua New Guinea

**Coordinates:** 7°14'S, 141°05'E;

**Location:** on the west bank of the Fly River, 120 km SSW of Kiunga, Western Province.

**Area:** 1,680 ha.

**Altitude:** 20m.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 14 & 18.

**Description of site:** A lateral lake with a catchment area of 23,000 ha, formed by a tributary stream being blocked through accretion by the Fly River. The lake is connected to the Fly River by a narrow channel 5m wide. The maximum depth of the lake is 6.5m; there are seasonal fluctuations in water level, high levels occurring in February-October and low levels in December. The lake occasionally dries out completely. The water is fresh and neutral-alkaline. A surface temperature of 27.3°C and a Secchi disc reading of 1.0m have been recorded.

**Climatic conditions:** Humid tropical climate with an average annual rainfall of 2,540 mm. The mean monthly rainfall varies from 330 mm in March to 74 mm in July.

**Principal vegetation:** The lake is surrounded by herbaceous swamps with *Phragmites karka* and *Saccharum* sp dominant. The lake vegetation includes *Pistia stratiotes*, *Ceratophyllum demersum*, *Nymphaea* spp and *Utricularia* sp.

**Land tenure:** Customary ownership.

**Conservation measures taken:** None.

**Conservation measures proposed:** None

**Land use:** Fishing (mainly subsistence but some commercial), deer hunting, subsistence agriculture, and some crocodile rearing. A small mission has been established on the lakeshore.

**Disturbances and threats:** Disposal of tailings from the Ok Tedi mine may result in some pollution with heavy metals. A fish kill has been reported by Maunsell & Partners (1982); this was believed to be due to anaerobic conditions resulting from vegetation decay during a period of low water level.

**Economic and social values:** Fishing, deer hunting and transportation.

**Fauna:** An important area for water birds, the introduced Rusa Deer *Cervus timorensis* and crocodiles.

**Special floral values:** The wetland supports a high diversity of freshwater plants.

**Research and facilities:** Facilities in the area include a Mission Station, school and clinic.

**References:** Chambers (1987); Maunsell & Partners (1982).

**Criteria for inclusion:** 1b, 2a, 3b.

**Source:** P.L. Osborne.

**Wetland name:** Lake Daviumbu

**Country:** Papua New Guinea

**Coordinates:** 7°36'S, 141°16'E;

**Location:** in the middle Fly region, upstream from the confluence of the Fly and Strickland Rivers, near Obo, Western Province.

**Area:** 1,168 ha.

**Altitude:** 20m.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 14 & 18.

**Description of site:** A lateral lake formed by a tributary stream being blocked through accretion by the Fly River. The lake is connected to the Fly River by a narrow channel 5m wide. Kaviananga Village is located on the lakeshore. The maximum depth of the lake is 4.2m; there are wide seasonal fluctuations in water level, with high levels in February-October and low levels in December. The lake occasionally dries out completely. The water is fresh and neutral-alkaline, with a conductivity of 150 uS cm. A surface temperature of 27.1°C and a Secchi disc reading of 1.3m have been recorded.

**Climatic conditions:** Humid tropical climate with an average annual rainfall of 2,300 mm. The mean monthly rainfall varies from about 300 mm in March to 70 mm in July.

**Principal vegetation:** The lake is surrounded by herbaceous swamp with *Phragmites karka* and *Saccharum* sp dominant. The aquatic vegetation is dominated by *Pistia stratiotes*, *Ceratophyllum demersum*, *Nymphaea macrosperma*, *N. violacea*, *Nelumbo nucifera* and *Utricularia aurea*. Other aquatic plants include *Azolla pinnata*, *Lobelia alisnoides*, *Cyperus platystylis*, *Hymenachne acutigluma*, *Ischaemum polystachyum*, *Oryza rufipogon*, *Sacciolepis myosuroides*, *Hanguana malayana*, *Blyxa aubertii*, *B. japonica*, *B. novoguineensis*, *B. octandra*, *Pogosremon stellatus*, *Nymphoides indica*, *Ludwigia octovalvis*, *Limnophila aromatica* and *L. indica*.

**Land tenure:** Customary ownership.

**Conservation measures taken:** None.

**Conservation measures proposed:** None

**Land use:** Fishing (mainly subsistence but some commercial), deer hunting, subsistence agriculture, and some crocodile rearing.

**Disturbances and threats:** Disposal of tailings from the Ok Tedi mine may result in some pollution with heavy metals.

**Economic and social values:** Fishing, deer hunting and transportation.

**Fauna:** An important site for water birds, the introduced Rusa Deer *Cervus timorensis* and crocodiles.

**Special floral values:** The lake supports a high diversity of freshwater plants.

**Research and facilities:** There is a trade store and small river port at Obo.

**References:** Chambers (1987); Osborne *et al.* (in press); Maunsell & Partners (1982).

**Criteria for inclusion:** 1b, 2a, 3b.

**Source:** P.L. Osborne.

**Wetland name:** Bensbach River and the Tonda Wildlife Management Area

**Country:** Papua New Guinea

**Coordinates:** 8°15'-9°15'S, 141°01'-141°45'E;

**Location:** south of the Fly River, on the Irian Jaya border, Western Province.

**Area:** 590,000 ha.

**Altitude:** 0-40m.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 06, 11, 13, 14, 15, 18 & 21.

**Description of site:** A vast area of permanent swamps, small freshwater lakes, swamp forest, seasonally flooded savanna and gallery forest on the floodplain of the Bensbach River, with some intertidal mudflats along the adjacent coast.

**Climatic conditions:** Humid tropical climate.

**Principal vegetation:** Open savanna grasslands, herbaceous swamps and swamp forest.

**Land tenure:** Customary ownership.

**Conservation measures taken:** The wetland has been designated as a Wildlife Management Area.

**Conservation measures proposed:** None

**Land use:** Subsistence hunting of deer, and tourism, particularly wildlife photography and sport fishing for Barramundi *Lates calcarifer*.

**Disturbances and threats:** There is a little disturbance from tourism.

**Economic and social values:** The area has abundant wildlife; it has been used for scientific research on the introduced Rusa Deer and provides an important tourist resort.

**Fauna:** One of the most important wetlands for both resident and migratory water birds in New Guinea, with several species occurring in enormous numbers. In years of drought in northern Australia, the Bensbach area becomes an important refuge for Australian waterfowl. Waterfowl observed during a brief survey of a small part of the area in early August 1988 included:

1,000 *Phalacrocorax sulcirostris*

at least 400 *Pelecanus conspicillatus*

1,000 *P. melanoleucos*

100 *Anhinga novaehollandiae*

500 *Nycticorax caledonicus*

25 *Butorides striatus*

1,000 *Egretta picata*

150 *E. garzetta*

1,000 *E. intermedia*

200 *E. alba*

2 *E. novaehollandiae*

8 *Ardea sumatrana*

10 *Ephippiorhynchus asiaticus*

150 *Carphibis spinicollis*

1,500 *Plegadis falcinellus*

800 *Platalea regia*

5,000 *Anseranas semipalmata*

150 *Tadorna radjah*

20 *Grus rubicunda*

a few *Irediparra gallinacea*

250 *Himaniopus leucocephalus*

2,000 *Vanellus miles*

and several thousand *Threskiornis molucca*, small numbers of *Dendrocygna arcuata*, *D. guttata*, *Nettapus puichellus*, *Anas gibberifrons* and *A. superciliosa*, and small numbers of *Chlidonias hybrida* and *Gelochelidon nilotica*. The savanna grasslands along the Bensbach River are a staging area for a large proportion of the world population of Little Curlew *Numenius minutus*, migrating between breeding grounds in eastern Siberia and wintering areas in northern Australia; concentrations of over 10,000 individuals have been recorded in October. Other common migrant shorebirds from eastern Asia include *Glareola maldivarum*, *Pluvialis dominica*, *Charadrius mongolus*, *Tringa stagnatilis*, *T. nebularia*, *T.*

*glareola*, *Actitis hypoleucos*, *Gallinago megala*, *Calidris subminuta*, *C. acuminata* and *C. ferruginea*. *Stiltia isabella* is a common migrant from Australia. Other species of waterfowl known to occur in the area include *Ixobrychus flavicollis*, *Anas querquedula*, *Chlidonias leucoptera* and *Sterna albifrons*. The riverine marshes along the Bensbach River are one of the few known localities for the very local Fly River Grassbird *Megalurus albolimbatus*. The area supports a very high density of birds of prey including *Haliastur sphenurus*, *H. indus*, *Haliaeetus leucogaster*, *Circus approximans* (a non-breeding visitor from Australia), *Aquila audax* and *Falco berigora*. The White-bellied Sea-Eagle *H. leucogaster* is exceptionally common; at least 55 were recorded in the Bensbach area in August 1988. The Australian Bustard *Ardeotis australis* is a fairly common resident on the grasslands.

The area supports very large populations of the introduced Rusa Deer *Cervus timorensis* (tens of thousands) and Agile Wallaby *Macropus agilis*. Other fauna includes Spotted Cuscus Phalanger macullatus, flying fox *Pteropus* sp, monitor lizard *Varanus salvadori*, New Guinea Freshwater Crocodile *Crocodylus novaeguineae* and Estuarine Crocodile *C. porosus*.

**Special floral values:** No information.

**Research and facilities:** There is a tourist lodge in the area.

**References:** Kwapena (1975); Lindgren (1972 & 1975).

**Criteria for inclusion:** 123.

**Source:** Gaikovina R. Kula and Derek A. Scott.

**Wetland name:** Lake Birip

**Country:** Papua New Guinea

**Coordinates:** 5°32'S, 143°48'E;

**Location:** in the central highlands, 12 km southeast of Wabag, Enga Province.

**Area:** 2.9 ha.

**Altitude:** 1,900m.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 15.

**Description of site:** A small lake in a relatively unmodified volcanic crater in a cumulodome of Recent origin. There are no streams flowing into or out of the lake. The maximum depth is 5.3m and the mean depth is 1.6m. The water is fresh and neutral-alkaline.

**Climatic conditions:** Humid tropical climate with an average annual rainfall of 3,015 mm. The mean maximum daily air temperature is 22.2°C, and the mean minimum, 11.8°C.

**Principal vegetation:** The edge of the small catchment area is ringed with mature *Casuarina* trees. The aquatic vegetation is dominated by *Nymphoides indica*, *N. geminata*, *Scirpus mucronatus* and *Limnophila indica*. *Utricularia* sp and *Eleocharis sphacelata* are also present.

**Land tenure:** Customary ownership.

**Conservation measures taken:** None.

**Conservation measures proposed:** None

**Land use:** Subsistence pig rearing.

**Disturbances and threats:** There are some signs of erosion in the small catchment area, caused by pig and human activities.

**Economic and social values:** *Eleocharis sphacelata* is cultivated for making grass skirts.

**Fauna:** The Common Carp *Cyprinus carpio* has been introduced into the lake. No other information is available on the fauna.

**Special floral values:** None known.

**Research and facilities:** None

**References:** Chambers (1987); Chambers *et al.* (1987); Walker & Flenley (1979).

**Criteria for inclusion:** lb.

**Source:** P.L. Osborne.

**Wetland name:** Lake Ipea and the Sirunki Basin

**Country:** Papua New Guinea

**Coordinates:** 5°23'S, 143°32'E;

**Location:** in the central highlands, 25 km WNW of Wabag, Enga Province.

**Area:** Lake Ipea 76 ha; Sirunki Basin 2,900 ha.

**Altitude:** 2,570m.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 14.

**Description of site:** The Sirunki Basin straddles the main watershed divide of Papua New Guinea. Lake Ipea is situated in the northern part of the basin that forms part of the Sepik River catchment. The southern part of the basin, which is some 2m higher, is part of the Fly River system. The maximum depth of the lake is 11.9m, the mean depth 5.7m. Much of the lakeshore has a vertical bank with water depths at the edge ranging from 1 to 1.5m. The water is fresh and neutral-alkaline.

**Climatic conditions:** Humid subtropical climate with an average annual rainfall of 3,015 mm. The mean daily maximum air temperature is 17.2°C, and the mean daily minimum, 8.3°C.

**Principal vegetation:** *Scirpus mucronatus* is dominant at the edge of the swamp zone. *Potamogeton malaianus* and Characeae are the dominant rooted aquatic plants. Other aquatic plants include *Nitella cristata*, *N. pseudoflabellata*, *Azolla pinnata*, *Equisetum debile*, *Thelypteris confluens*, *Acorus calamus*, *Carex* sp, *Eleocharis sphacelata*, *Scirpus crassiusculus*, *S. inundatus*, *Elatine triandra*, *Phragmites karka*, *Myriophyllum pedunculatum*, *Pogostemon stellatus*, *Utricularia australis*, *U. minor*, *Nymphoides geminata*, *Polygonum minus*, *P. strigosum*, *Potamogeton pusillus*, *Limnophila aromatica*, *L. indica*, *Sparganium simplex*, *Typha orientalis* and *Hydrocotyle sibthorpioides*.

**Land tenure:** Customary ownership.

**Conservation measures taken:** None.

**Conservation measures proposed:** None

**Land use:** Subsistence agriculture and some forestry. The watershed around the basin has many agricultural gardens of subsistence farmers. Cattle graze down to the edge of the lake, and there is a forestry plantation above the southern shore.

**Disturbances and threats:** None known.

**Economic and social values:** No information.

**Fauna:** The Common Carp *Cyprinus carpio* has been introduced into the lake. No other information is available on the fauna.

**Special floral values:** None known.

**Research and facilities:** None

**References:** Chambers *et al.* (1987); Goldsmith *et al.* (1983); Walker (1966 & 1972); Walker & Flenley (1979).

**Criteria for inclusion:** lb.

**Source:** P.L. Osborne.

**Wetland name:** Lake Onim

**Country:** Papua New Guinea

**Coordinates:** 6°10'S, 143°59'E;

**Location:** near Mount Giluwe, 35 km east of Mendi, Southern Highlands Province.

**Area:** 16 ha.

**Altitude:** 2,260m.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 14.

**Description of site:** Lake Onim lies above a densely populated grassy intermontane valley between the extinct volcanic peaks of Mount Giluwe (4,367m) and Mount Ialibu (3,465m). Water flows into the lake from the southern and eastern slopes of Mount Giluwe. The maximum depth of the lake is 10.6m, the mean depth 4.5m. The water is fresh and neutral-alkaline.

**Climatic conditions:** Humid subtropical climate with an average annual rainfall of 2,586 mm. The mean daily maximum air temperature is 20.2°C, and the mean daily minimum, 9.9°C.

**Principal vegetation:** Much of the lake is surrounded by *Saccharum* sp. Three distinct zones are apparent in the aquatic vegetation: one dominated by *Scirpus mucronatus* with *Eleocharis tetraquetra*, *Nymphoides geminata*, *Hydrocotyle sibthorpioides*, *Paspalum* sp, *Lindernia* sp and *Cyperus* sp, the second dominated by *Eleocharis sphacelata*, and the third a zone of Characeae (*Chara fibrosa*, *C. globularis*, *Nitella cristata* and *N. pseudoflabellata*). Other aquatic plants include *Carex* sp, *Fimbristylus salbundia*, *Juncus prismatocarpus*, *Gahnia sieberiana*, *Lipocarpa chinensis*, *Rhynchospora rugosa*, *Machaerina rubinginosa*, *Dysophylla verticillata*, *Ranunculus* spp, *Viola arcuata*, *Xyris capensis*, *Wahlenbergia marginata*, *Adenostemma hirsutum*, *Anaphalis lorentzii*, *Eriocaulon hookerianum*, *Haloragis halconensis*, *Trachymene novoguineensis*, *Pogostemon stellatus*, *Utricularia minor*, *Polygonum minus*, *P. strigosum* and *Limnophila aromatica*.

**Land tenure:** Customary ownership.

**Conservation measures taken:** None.

**Conservation measures proposed:** None

**Land use:** The area immediately surrounding the lake is lightly populated with a few houses of subsistence farmers. There are numerous signs of pig activity along the northern shore of the lake.

**Disturbances and threats:** None known.

**Economic and social values:** No information.

**Fauna:** The Common Carp *Cyprinus carpio* has been introduced into the lake. No other information is available on the fauna.

**Special floral values:** The lake supports a very diverse aquatic flora.

**Research and facilities:** None

**References:** Chambers *et al.* (1987); Conn (1979b).

**Criteria for inclusion:** lb.

**Source:** P.L. Osborne.

**Wetland name:** Lake Papapli

**Country:** Papua New Guinea

**Coordinates:** 5°53'S, 143°36'E;

**Location:** in the Marient Basin, southeast of the Kandep Basin and 30 km NNE of Mendi, Enga Province.

**Area:** Lake Papapli 120 ha; Marient Basin 7,500 ha.

**Altitude:** 2,420m.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 14.

**Description of site:** A small freshwater lake in the Marient Basin, fed and drained by the Marient River and several tributaries. The Marient River is a tributary of the Lai River and part of the Purari River catchment. The lake is joined to the Marient River by a channel one

km long. It has a maximum depth of 3.2m and a mean depth of 2.0m. The water is fresh and neutral-alkaline.

**Climatic conditions:** Humid subtropical climate with an average annual rainfall of 2,800 mm. The mean daily maximum air temperature is 18.7°C, and the mean daily minimum, 9.1°C. Frosts are common at this altitude.

**Principal vegetation:** Plant cover is continuous over much of the lake, with only occasional bare patches of mud. Plants are common even at the greatest depth found in the lake (3.2m). Two species, *Potamogeton pusillus* and *Ceratophyllum demersum*, and Characeae are dominant. There is no zonation and all species occur as mixed stands or in monospecific clumps. Other aquatic plants include *Eleocharis sphacelata* and *Nitella pseudoflabellata*.

**Land tenure:** Customary ownership.

**Conservation measures taken:** None.

**Conservation measures proposed:** None

**Land use:** Subsistence agriculture. About 5,000 people live in the basin, mainly as subsistence farmers on the lower slopes and drier parts of the basin floor.

**Disturbances and threats:** None known.

**Economic and social values:** No information.

**Fauna:** *Pelecanus conspicillatus* was recorded at the lake in 1983. No other information is available on the fauna.

**Special floral values:** The lake has an interesting flora; *Ceratophyllum demersum*, which is normally considered to be a lowland species, is common, and the lake is only the second known site in New Guinea for *Potamogeton pusillus*.

**Research and facilities:** None

**References:** Chambers (1987); Chambers *et al.* (1987); Goldsmith *et al.* (1983).

**Criteria for inclusion:** la.

**Source:** P.L. Osborne.

**Wetland name:** Lake Parago

**Country:** Papua New Guinea

**Coordinates:** 5°49'S, 143°28'E;

**Location:** in the Kandep Basin, 40 km NNW of Mendi, Enga Province. Area: 36 ha.

**Altitude:** 2,340m.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 14.

**Description of site:** A small freshwater lake and associated marshes in the Kandep Basin, a swampy alluvial plain fed and drained by the Lai River. The western part of the basin is dominated by limestone formations with smaller areas of sandstones, siltstones and mudstones. The lake is connected to the Lai River by a meandering channel approximately 10m wide. At times of high water levels, water from the Lai River flows into the lake through this channel.

The same channel drains the lake during periods of low river flow. The lake has a maximum depth of 7.0m and a mean depth of 4.3m. The water is fresh and neutral-alkaline.

**Climatic conditions:** Humid subtropical climate with an average annual rainfall of 2,800 mm. The mean daily maximum air temperature is 19.3°C, and the mean daily minimum, 9.7°C.

**Principal vegetation:** Fringing swamps of *Phragmites karka* and *Typha orientalis*. *Potamogeton malaianus* is common in the lake at depths of between 1.2 and 3.3m; *Polygonum lapathifolium* occurs at depths of 1.0-2.2m. These two species are also abundant in the Lai River. Other species in the lake include *Acorus calamus*, *Nasturtium officinale*, *Eleocharis sphacelata*, *Nitella pseudoflabellata*, *Utricularia exoleta* and *Azolla pinnata*. *Limnophila indica*

occurs in dense stands in sheltered areas.

**Land tenure:** Customary ownership.

**Conservation measures taken:** None.

**Conservation measures proposed:** None

**Land use:** Subsistence agriculture; some 12,000 people live in the Kandep Basin.

**Disturbances and threats:** None known.

**Economic and social values:** No information.

**Fauna:** No information.

**Special floral values:** None known.

**Research and facilities:** None

**References:** Chambers (1987); Chambers *et al.* (1987); Goldsmith *et al.* (1983).

**Criteria for inclusion:** lb.

**Source:** P.L. Osborne.

**Wetland name:** Lake Kutubu

**Country:** Papua New Guinea

**Coordinates:** 6°25'S, 143°20'E;

**Location:** 45 km southwest of Mendi, Southern Highlands Province. Area: 4,924 ha.

**Altitude:** 820m.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 14.

**Description of site:** A permanent, deep freshwater lake with surrounding marshes, formed by the damming of a valley with a lava flow. The lake is oligotrophic, and has a great diversity of phytoplanktonic desmids. Some parts of the lake are shallow and dry out seasonally. The lake has a maximum depth of 70m and a mean depth of 36m. The water is fresh and neutral-alkaline. Secchi disc readings of 6.5-8.0m have been reported.

**Climatic conditions:** Humid subtropical climate.

**Principal vegetation:** The perimeter of the lake is dominated by *Phragmites karka*; the most abundant submerged aquatics are *Najas* sp, *Ceratophyllum demersum*, *Chara* sp and *Nitella* sp.

**Land tenure:** Customary ownership.

**Conservation measures taken:** None.

**Conservation measures proposed:** The establishment of a Wildlife Management Area has been proposed.

**Land use:** Subsistence agriculture and fishing.

**Disturbances and threats:** A fish kill, reported by Bayly *et al.* (1970), was ascribed to the upwelling of anoxic hypolimnetic waters.

**Economic and social values:** The lake supports a small fishery, and has some potential for tourism.

**Fauna:** Little information is available. Waterfowl known to occur at the lake include *Phalacrocorax sulcirostris*, *P. melanoleucos*, *Anhinga novaehollandiae*, *Nycticorax caledonicus*, *Egretta intermedia*, *E. alba*, *Anas superciliosa*, *Actitis hypoleucos* and *Heteroscelus brevipes*. The zooplankton includes the calanoid *Calamoecia ultima* (*Brunella ultima*). Endemic rainbow fishes are present.

**Special floral values:** No information.

**Research and facilities:** There is a village guest house near the lake.

**References:** Bayly (1962); Bayly *et al.* (1970); Chambers (1987); Conn (1979c); Schodde & Hitchcock (1968).

**Criteria for inclusion:** lb, 2b, 2d.

**Source:** Gaikovina R. Kula and P.L. Osborne.

**Wetland name:** Lake Wololo  
**Country:** Papua New Guinea  
**Coordinates:** 5°51'S, 142°53'E:  
**Location:** 5 km west of Tan, Southern Highlands Province.

**Area:** 4 ha.

**Altitude:** 1,700m.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 14.

**Description of site:** A small lake fed by several streams flowing from the low surrounding hills. Most of the catchment area is covered with disturbed rain forest. The lake has a maximum depth of 8.5m and a mean depth of 3.4m. The water is fresh and neutral-alkaline.

**Climatic conditions:** Humid subtropical climate with an average annual rainfall of 2,693 mm. The mean daily maximum air temperature is 23.6°C, and the mean daily minimum, 12.9°C.

**Principal vegetation:** The aquatic vegetation is characterized by a floating mat of vegetation extending up to lagoon from the edge. The mat consists mostly of *Leersia hexandra* and *Scirpus* sp. *Limnophila indica*, *Caldesia parnassifolia* and *Najas tenuifolia* grow in shallow water.

**Land tenure:** Customary ownership.

**Conservation measures taken:** None.

**Conservation measures proposed:** None

**Land use:** Subsistence agriculture; small areas of the catchment are cultivated and there are abundant signs of pig activity around the edge of the lake.

**Disturbances and threats:** None known.

**Economic and social values:** No information.

**Fauna:** No information.

**Special floral values:** None known.

**Research and facilities:** None

**References:** Chambers *et al.* (1987).

**Criteria for inclusion:** lb.

**Source:** P.L. Osborne.

**Wetland name:** Lake Wongabi  
**Country:** Papua New Guinea  
**Coordinates:** 5°48'S, 142°49'E;  
**Location:** 14 km WNW of Tan, Southern Highlands Province.

**Area:** 4 ha.

**Altitude:** 1,700m.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 14.

**Description of site:** A small lake situated in a sinkhole with no streams flowing into or out of it. The major part of the inner slopes of the sinkhole are covered in disturbed rain forest, and grass occurs around most of the perimeter of the lake. The lake has a maximum depth of 7.3m and a mean depth of 4.2m; the water level fluctuates over a range of 2m. The water is fresh and neutral-alkaline.

**Climatic conditions:** Humid subtropical climate with an average annual rainfall of 2,693 mm. The mean daily maximum air temperature is 23.6°C, and the mean daily minimum, 12.9°C.

**Principal vegetation:** *Eleocharis retroflexa*, *Blyxa aubertii*, *Limnophila indica*, *Najas tenuifolia*, *Polygonum* sp and *Leersia hexandra*.

**Land tenure:** Customary ownership.  
**Conservation measures taken:** None.  
**Conservation measures proposed:** None  
**Land use:** Subsistence agriculture.  
**Disturbances and threats:** None known.  
**Economic and social values:** No information.  
**Fauna:** No information.  
**Special floral values:** None known.  
**Research and facilities:** None  
**References:** Chambers *et al.* (1987).  
**Criteria for inclusion:** lb.  
**Source:** P.L. Osborne.

**Wetland name:** Lake Kopiago  
**Country:** Papua New Guinea  
**Coordinates:** 5°25'S, 142°28'E;  
**Location:** near Kopiago, 70 km northwest of Tan, Southern Highlands Province.  
**Area:** 150 ha.  
**Altitude:** 1,316m.  
**Biogeographical Province:** 5.1.13.  
**Wetland type:** 14.  
**Description of site:** A shallow, freshwater lake surrounded by subsistence agriculture. The water is neutral-alkaline.  
**Climatic conditions:** Humid subtropical climate.  
**Principal vegetation:** No information.  
**Land tenure:** Customary ownership.  
**Conservation measures taken:** The traditional landowners have customary laws to protect the area.  
**Conservation measures proposed:** The lake has been proposed as a Wildlife Management Area.  
**Land use:** Subsistence agriculture and fishing.  
**Disturbances and threats:** An increase in land use is likely.  
**Economic and social values:** The lake supports a small fishery.  
**Fauna:** No information.  
**Special floral values:** No information.  
**Research and facilities:** The District Headquarters are located near the lake, which can be reached by road.  
**References:** None  
**Criteria for inclusion:** lb.  
**Source:** Gaikovina R. Kula.

**Wetland name:** Malai Wetland  
**Country:** Papua New Guinea  
**Coordinates:** 2°09'S, 146°43'E;  
**Location:** on the southwest coast of Manus Island, Manus Province, Bismarck Archipelago.  
**Area:** 14,700 ha.  
**Altitude:** Sea level.  
**Biogeographical Province:** 5.1.13.  
**Wetland type:** 07, 15, 18 & 21.

**Description of site:** A large area of floodplains, swamp forests, herbaceous swamps and mangrove swamps on the shores of Malai Bay, on the southwest coast of Manus Island in the Bismarck Archipelago.

**Climatic conditions:** Humid tropical climate.

**Principal vegetation:** Herbaceous swamps, swamp forest and mangrove forest. Freshwater plants recorded from Manus Province include *Stenochlaena palustris*, *Nephrolepis biserrata*, *Microsorium brassii*, *M. schneideri*, *Acrostichum speciosum*, *Ischaemum polystachyum* and *Ludwigia octovalvis*.

**Land tenure:** No information.

**Conservation measures taken:** None.

**Conservation measures proposed:** None

**Land use:** No information.

**Disturbances and threats:** The area is likely to be logged in the near future.

**Economic and social values:** No information.

**Fauna:** No details are available. Water birds known to occur on Manus Island include *Tachybaptus novaehollandiae*, *Ixobrychus flavicollis*, *Butorides striatus*, *Dendrocygna guttata*, *Anas gibberifrons*, *Pandion haliaetus*, *Haliaeetus leucogaster*, *Rallus philippensis*, *Porphyrio porphyrio*, *Pluvialis dominica*, *Numenius phaeopus*, *Actitis hypoleucos*, *Heteroscelus brevipes*, *Calidris acuminata*, *Sterna hirundo*, *S. albifrons* and *Halcyon chloris*.

**Special floral values:** No information.

**Research and facilities:** None

**References:** Kisokau (1980).

**Criteria for inclusion:** lb. 3b.

**Source:** P.L. Osborne and I. Burrows.

**Wetland name:** Kelaua Wetland

**Country:** Papua New Guinea

**Coordinates:** 2°08'S, 147°16'E;

**Location:** near Kelaua Harbour on the southeast coast of Manus Island, Manus Province, Bismarck Archipelago.

**Area:** c.10,000 ha.

**Altitude:** Sea level.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 07, 15, 18 & 21.

**Description of site:** A large area of floodplains, swamp forests and mangrove swamps with a small area of *Nypa* forest, on the south shore of the eastern tip of Manus Island in the Bismarck Archipelago.

**Climatic conditions:** Humid tropical climate.

**Principal vegetation:** Swamp forest, mangrove forest, *Nypa fruticans* forest and herbaceous swamps. Freshwater plants recorded from Manus Province include *Stenochlaena palustris*, *Nephrolepis biserrata*, *Microsorium brassii*, *M. schneideri*, *Acrostichum speciosum*, *Ischaemum polystachyum* and *Ludwigia octovalvis*.

**Land tenure:** No information.

**Conservation measures taken:** None.

**Conservation measures proposed:** None

**Land use:** No information.

**Disturbances and threats:** None known.

**Economic and social values:** No information.

**Fauna:** No details are available. Water birds known to occur on Manus Island include *Tachybaptus novaehollandiae*, *Ixobrychus flavicollis*, *Butorides striatus*, *Dendrocygna*

*guttata*, *Anas gibberifrons*, *Pandion haliaetus*, *Haliaeetus leucogaster*, *Rallus philippensis*, *Porphyrio porphyrio*, *Pluvialis dominica*, *Numenius phaeopus*, *Actitis hypoleucos*, *Heteroscelus brevipes*, *Calidris acuminata*, *Sterna hirundo*, *S. albifrons* and *Halcyon chioris*.

**Special floral values:** No information.

**Research and facilities:** None

**References:** Kisokau (1980).

**Criteria for inclusion:** 1b, 3b.

**Source:** P.L. Osborne and I. Burrows.

**Wetland name:** Namo Wetland and Lake Namo

**Country:** Papua New Guinea

**Coordinates:** 5°25'-5°45'S, 149°30'-150°05'E;

**Location:** 10-70 km west of Kimbe, on the north coast of West New Britain Province, New Britain.

**Area:** Namo Wetland c.100,000 ha; Lake Namo 400 ha.

**Altitude:** Near sea level.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 06, 07, 11, 13, 14, 15 & 18.

**Description of site:** Namo wetland is a large area of riverine marshes and floodplains with herbaceous swamps and oxbow lakes, to the south of three bays, Riebeck, Eleonora and Emeline, on the northwest coast of West New Britain. The floodplains are drained by several rivers including the Kulu (emptying into Riebeck Bay), the Kapuluk (Eleonora Bay) and Via (Emeline Bay). There are areas of intertidal mudflat and mangrove swamp along the shores of the bays. The largest freshwater lake in the region is Lake Namo (5°38'S, 149°35'E), situated on the east bank of the Via River about 12 km from the coast. The lake supports a rich growth of aquatic vegetation, and is surrounded by extensive lowland swamps with nipa and sago palms.

**Climatic conditions:** Humid tropical climate with an average annual rainfall of over 4,000 mm, most of which falls during the northwest monsoon in December-April. The southeast trade season in July and August is the driest time of the year. The average air temperature is 28°C, and the average relative humidity, 86%.

**Principal vegetation:** Herbaceous swamps, mangrove swamps and large areas of the nipa palm *Nypa fruticans* and sago palm *Metroxylon rumphii*. The vegetation at Lake Namo includes an abundant growth of lilies, sedges and *Phragmites karka*. Osborne (1987) lists the freshwater plants recorded from New Britain.

**Land tenure:** Customary ownership, subject to Timber Rights Purchase.

**Conservation measures taken:** None.

**Conservation measures proposed:** Bishop and Broome (1980) have proposed the establishment of a conservation area around Lake Namo.

**Land use:** Kapuluk Timber Rights Purchase covers large part of accessible lowland rainforest on West New Britain. Lake Namo lies within this Timber Rights Purchase Area.

**Disturbances and threats:** There is a proposal to carry out clear-felling and selective logging in the Lake Namo catchment area from operations within Kapuluk Timber Rights Purchase Area.

**Economic and social values:** No information.

**Fauna:** A very important area for waterfowl. As one of the largest freshwater lakes in New Britain, Lake Namo attracts large numbers of migratory water birds as well as resident species. During a brief helicopter survey in May 1979, Bishop and Broome (1980) recorded 300 *Phalacrocorax melanoleucos*, 30 *Ixobrychus sinensis* (probably breeding) and 150 *Egretta alba*, along with smaller numbers of *ixobrychus flavicollis*, *Dendrocygna arcuata*,

*Gallinula tenebrosa*, *Porphyrio porphyrio* and *Irediparra gallinacea*. Other water birds known to occur in the area include *Tachybaptus ruficollis*, *Pelecanus conspicillatus*, *Anhinga novaehollandiae*, *Nycticorax caledonicus*, *Egretta garzetta*, *E. intermedia*, *Dendrocygna guttata*, *Anas gibberifrons*, *A. superciliosa*, *Rallus philippensis*, *Porzana cinerea*, *Amaurornis olivaceus*, a variety of shorebirds, *Sterna hirundo*, *S. albifrons* and *Halcyon chioris*.

No information is available on the other fauna.

**Special floral values:** No information.

**Research and facilities:** None

**References:** Bishop (1983); Bishop & Broome (1980); Osborne (1987).

**Criteria for inclusion:** 1b, 2b, 3b.

**Source:** Eric Lindgren and P.L. Osborne.

**Wetland name:** Lake Dakataua

**Country:** Papua New Guinea

**Coordinates:** 5°02'S, 150°05'E;

**Location:** on the Willaumez Peninsula, 55 km north of Kimbe, West New Britain Province, New Britain.

**Area:** 4,920 ha.

**Altitude:** 76m.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 14.

**Description of site:** A large caldera lake, formed by the post-eruptive collapse of a volcanic crater. There is an island in the centre of the lake. The maximum depth is 120m; the water is fresh with a pH at the surface of 7.6-8.2, declining with depth to 7.1-7.5. A Secchi disc reading of 11.1m has been reported.

**Climatic conditions:** Humid tropical climate with an average annual rainfall of approximately 4,270 mm, most of which falls during the northwest monsoon from December to March or April. There is then a period of transition into the southeast trade season, which reaches its peak in July-August before dying out about September. The period after the northwest monsoon is usually one of light variable winds. Monthly mean maximum temperatures range from 29.5 to 30.8°C, and monthly mean minima, from 22.7 to 23.5°C.

**Principal vegetation:** Shallow water areas of the lake support heavy mixed growths of *Najas tenuifolia*, *Chara fibrosa*, *C. corallina* and *C. globularis*. These plants extend to depths of at least 8m, but appear to grow best between 2-4m. *Lemna perpusila* occurs in sheltered areas of the lake. Other aquatic plants include *Ludwigia octovalvis* and the fern *Nephrolepis biserrata*.

**Land tenure:** Customary ownership.

**Conservation measures taken:** None.

**Conservation measures proposed:** The lake and surrounding areas have been proposed as a National Park.

**Land use:** Subsistence fishing.

**Disturbances and threats:** None known.

**Economic and social values:** No information.

**Fauna:** The lake supports populations of both the Estuarine Crocodile *Crocodylus porosus* and the New Guinea Freshwater Crocodile *C. novaeguineae*. Water birds recorded during a brief survey in October 1979 included 57 *Tachybaptus ruficollis* (nesting), 68 *Phalacrocorax melanoleucos*, 120 *Dendrocygna arcuata* (reported to nest on the island), 35 *Himantopus leucocephalus* (nesting) and 4,000-5,000 *Phalaropus lobatus*. Other waterfowl known to occur at the lake include *Anas superciliosa*, *Pluvialis dominica*, *Charadrius*

*mongolus*, *C. leschenaultii*, *Actitis hypoleucos*, *Heteroscelus brevipes*, *Calidris acuminata* and *Sterna bergii*.

The lake is unusual in that it does not have any fishes, despite large populations of dragonfly larvae and freshwater shellfish. The zooplankton includes one rotifer, one ostracod, one copepod and seven cladocerans. Ball & Glucksman (1980) found a rather simple benthic fauna limited to the top 20m of the lake; they attributed this simplicity to the youth and isolation of the lake.

**Special floral values:** No information.

**Research and facilities:** None

**References:** Ball & Glucksman (1980); Bishop (1983); Chambers (1987); Miniotas & Lindgren (1972a).

**Criteria for inclusion:** 1a, 2a, 3b.

**Source:** P.L. Osborne.

**Wetland name:** Lake Hargy

**Country:** Papua New Guinea

**Coordinates:** 5°22'S, 151°08'E;

**Location:** 16 km east of Bialla, straddling the border of West and East New Britain Provinces, New Britain.

**Area:** 930 ha.

**Altitude:** 330m.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 14.

**Description of site:** A freshwater caldera lake in the Nakanai Mountains of central New Britain.

**Climatic conditions:** Humid tropical climate with an average annual rainfall of about 4,400 mm, most of which falls during the northwest monsoon in December-April. The Southeast Trade season in July and August is the driest time of year. Temperatures range from an average of 23°C at night to 31°C during the day.

**Principal vegetation:** No information.

**Land tenure:** Customary ownership.

**Conservation measures taken:** None.

**Conservation measures proposed:** Miniotas and Lindgren (1972) proposed the establishment of a Nature Conservation Area to include Lake Hargy, nearby Lake Gallesuelo (which emits steam) and the northern slopes of the Nakanai Mountains, but no action has as yet been taken.

**Land use:** No information.

**Disturbances and threats:** None known.

**Economic and social values:** The region is noted for its spectacular scenery.

**Fauna:** No information.

**Special floral values:** No information.

**Research and facilities:** Accommodation is available at nearby Kimbe and Hoskins.

**References:** Chambers (1987); Miniotas & Lindgren (1972b).

**Criteria for inclusion:** 1a.

**Source:** Eric Lindgren.

**Wetland name:** Toriu Wetland

**Country:** Papua New Guinea

**Coordinates:** 4°43'S, 151°40'E;

**Location:** on the northeast coast of New Britain, 80 km southwest of Rabaul, East New Britain Province.

**Area:** 81,300 ha.

**Altitude:** Near sea level.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 02, 07, 11, 13, 15 & 18.

**Description of site:** A large area of estuarine marshes and floodplains along the lower courses of the Toriu, Nesai and Pali Rivers and several smaller rivers, draining into a large bay on the northeast coast of New Britain. Mangrove forests occur in the north and there are extensive areas of herbaceous swamps.

**Climatic conditions:** Humid tropical climate.

**Principal vegetation:** Herbaceous swamps and mangrove forest. Osborne (1987) lists the freshwater plants recorded from New Britain.

**Land tenure:** No information.

**Conservation measures taken:** None.

**Conservation measures proposed:** None

**Land use:** No information.

**Disturbances and threats:** No information.

**Economic and social values:** No information.

**Fauna:** No details are available. Water birds known to occur at the wetlands of New Britain include *Tachybaptus ruficollis*, *Pelecanus conspicillatus*, *Phalacrocorax melanoleucos*, *Anhinga novaehollandiae*, *Ixobrychus sinensis*, *I. flavicollis*, *Nycticorax caledonicus*, *Butorides striatus*, *Egretta garzetta*, *E. intermedia*, *E. alba*, *Dendrocygna guttata*, *D. arcuata*, *Anas gibberifrons*, *A. superciliosa*, *A. querquedula*, *Pandion haliaetus*, *Rallus philippensis*, *Porzana cinerea*, *Amaurornis olivaceus*, *Porphyrio porphyrio*, *Irediparra gallinacea*, *Himantopus leucocephalus*, *Pluvialis dominica*, *Numenius minutus*, *N. phaeopus*, *N. madagascariensis*, *Actitis hypoleucos*, *Heteroscelus brevipes*, *Calidris subminuta*, *C. acuminata*, *Sterna hirundo*, *S. albifrons* and *Halcyon chloris*.

**Special floral values:** No information.

**Research and facilities:** None

**References:** Osborne (1987).

**Criteria for inclusion:** lb. 2b, 3b.

**Source:** P.L. Osborne and I. Burrows.

**Wetland name:** Empress Augusta Bay Wetland

**Country:** Papua New Guinea

**Coordinates:** 6°08'-6°37'S, 154°58'-155°20'E;

**Location:** between Laruma Point and Motupena Point, on the west coast of Bougainville Island, North Solomon Islands.

**Area:** 90,100 ha.

**Altitude:** Near sea level.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 02, 07, 11, 13, 15 & 18.

**Description of site:** A large area of floodplains with herbaceous cover, nipa swamps and mangrove swamps around Empress Augusta Bay on the west coast of Bougainville. The wetland includes the lower reaches and estuaries of the Laruma, Torokina, Jaba, Pagana and Hupai Rivers.

**Climatic conditions:** Humid tropical climate.

**Principal vegetation:** Herbaceous swamps, *Nypa fruticans* swamp and mangrove forest.

Freshwater plants include *Stenochlaena milnei*, *Nephrolepis* sp, *Colocasia esculenta*, *Ipomoea aquatica*, *Eleocharis dulcis*, *Hanguana malayana*, *Aeschynomene indica*, *Limnophila aromatica*, *Polygonum attenuatum* and *P. strigosum*.

**Land tenure:** No information.

**Conservation measures taken:** None.

**Conservation measures proposed:** None

**Land use:** No information.

**Disturbances and threats:** Tailings and spoil from Bougainville copper mine are deposited in the lower reaches of the Jaba River.

**Economic and social values:** No information.

**Fauna:** No details are available. Water birds recorded from the wetlands of the North Solomons include *Pelecanus conspicillatus*, *Phalacrocorax sulcirostris*, *P. melanoleucos*, *Ixobrychus sinensis*, *I. flavicollis*, *Nycticorax caledonicus*, *Egretta garzetta*, *E. intermedia*, *E. alba*, *E. novaehollandiae*, *Plegadis falcinellus*, *Anas superciliosa*, *Porzana cinerea*, *Amaurornis olivaceus*, *Porphyrio porphyrio*, *Pluvialis dominica*, *Actitis hypoleucos*, *Heteroscelus brevipes*, *Calidris acuminata*, *Philomachus pugnax*, *Chlidonias hybrida*, *Sterna hirundo* and *S. albifrons*.

**Special floral values:** No information.

**Research and facilities:** None

**References:** None

**Criteria for inclusion:** 1b, 2b, 3b.

**Source:** P.L. Osborne and I. Burrows.

**Wetland name:** Abia Wetland and Lahala Lake

**Country:** Papua New Guinea

**Coordinates:** 6°30'-6°41'S, 155°48'-155°56'E;

**Location:** on the southeast coast of Bougainville Island, in the North Solomon Islands.

**Area:** Abia wetland 29,700 ha; Lahala Lake 550 ha.

**Altitude:** Near sea level.

**Biogeographical Province:** 5.1.13.

**Wetland type:** 11, 13, 14, 15 & 18.

**Description of site:** Abia wetland consists mostly of herbaceous swamps along the floodplains of the Lului and Abia Rivers. The rivers rise on Mount Taraka (2,219m) to the west, and drain into the adjacent Torau Bay. Lake Lehala (550 ha) is a small freshwater lake in the south of the area, near the extreme southeastern tip of Bougainville Island.

**Climatic conditions:** Humid tropical climate.

**Principal vegetation:** Herbaceous swamps with *Stenochlaena milnei*, *Nephrolepis* sp, *Colocasia esculenta*, *Ipomoea aquatica*, *Eleocharis dulcis*, *Hanguana malayana*, *Aeschynomene indica*, *Limnophila aromatica*, *Polygonum attenuatum* and *P. strigosum*.

**Land tenure:** No information.

**Conservation measures taken:** None.

**Conservation measures proposed:** None

**Land use:** No information.

**Disturbances and threats:** No information.

**Economic and social values:** No information.

**Fauna:** No details are available. Water birds known to occur at the wetlands of the North Solomons include *Pelecanus conspicillatus*, *Phalacrocorax sulcirostris*, *P. melanoleucos*, *Ixobrychus sinensis*, *I. flavicollis*, *Nycticorax caledonicus*, *Egretta garzetta*, *E. intermedia*, *E. alba*, *E. novaehollandiae*, *Plegadis falcinellus*, *Anas superciliosa*, *Porzana cinerea*, *Amaurornis olivaceus*, *Porphyrio porphyrio*, *Pluvialis dominica*, *Actitis hypoleucos*,

*Heteroscelus brevipes*, *Calidris acuminata*, *Philomachus pugnax*, *Chlidonias hybrida*, *Sterna hirundo* and *S. albifrons*.

**Special floral values:** No information.

**Research and facilities:** None

**References:** Schodde (1977).

**Criteria for inclusion:** 1b, 2b, 3b.

**Source:** P.L. Osborne and I. Burrows.

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