

NAURU

INTRODUCTION

Area: Published figures range from 20.7 to 21.3 sq.km.

Population: 9,100 (1990).

The Republic of Nauru comprises a single raised coral limestone island in the west central Pacific Ocean at 0°31'S, 166°56'E, some 42 km south of the Equator. Its nearest neighbour is Banaba (Ocean) Island, 306 km to the east in the Republic of Kiribati. Nauru is one of the three great phosphatic-rock islands of the Pacific (the other two being Banaba in Kiribati and Makatea in French Polynesia). It is oval-shaped and bounded by a reef platform which is exposed at low tide. The ground rises gently from sandy beaches to a fertile coastal belt, 100-300 m wide, with soils consisting of a mixture of sand and fine corals. Inland, a coral-limestone escarpment rises to a central plateau with an average height of about 50 m and a high point at 71 m. This plateau, which covers about 75% of the island's total area, is composed largely of phosphate bearing rocks. These deposits of tricalcium diphosphate, the second richest deposits in the world (after those of neighbouring Banaba Island), occur in small isolated masses (nests) and pits, separated by walls and pinnacles of very hard dolomite limestone. The undisturbed plateau soils are classified as Lithic Haplustolls, Typic Haplustolls and Lithic Ustorthents mainly derived from phosphate materials and, to a lesser extent, dolomitic limestone (Manner and Morrison, 1991).

The climate is tropical with daily temperatures ranging between 24.4°C and 33.9°C, and average humidity between 70 and 80%. The average annual temperature is 27°C, with a seasonal variation of 1°C. Annual rainfall averages about 2,000 mm, much of it occurring during the monsoon season from November to February. However, the annual rainfall is subject to wide fluctuations, ranging from as little as 104 mm to over 4,572 mm. Droughts are not uncommon, and several lasting more than 12 months have occurred this century. Streams are non-existent. The tidal range is about 2.0 m.

Nauru was under German administration from the 1880s until 1914, and then under Australian administration (on behalf of Australia, New Zealand and the U.K.) until the 1960s. In 1966, the Nauruans were given self government, and in January 1968, full independence was achieved. Indigenous Nauruans, of mixed Polynesian, Micronesian and Melanesian descent, make up about 60% of the population, the rest being a mixture of Australians, New Zealanders, Chinese and other Pacific Islanders. There is no capital city as such, although Aiwo and Yaren Districts contain the bulk of the island's governmental and commercial structures. The inhabitants live in small settlements scattered throughout the island, but mostly in the coastal belt.

Nauru's economy is based mainly on the phosphate mining industry. Except for interruptions during World War I and World War II, the phosphate deposits have been mined continuously since 1906. Mining activities were taken over by the Nauru Phosphate Corporation in 1970, and the industry now produces in excess of two million metric tonnes per year. However, it is estimated that the phosphate deposits will be exhausted around the year 2000.

The phosphate revenues bring the island one of the highest per capita incomes in the world. Since independence, over 60% of the revenue from phosphate exports has been invested in long-term trust funds, designed to provide the inhabitants with a future income when the phosphate deposits are exhausted. Agriculture is very limited, with a few fruit trees, coconuts, *Pandanus* and breadfruit planted or protected along the coastal belt and in the area around Buada Lagoon. There is also some small-scale cultivation of bananas and vegetables in the coastal belt and in the swampy area bordering Buada Lagoon.

The natural vegetation comprises mixed plateau forest, atoll forest and scrub with *Pandanus* and *Cocos* in the coastal belt, and less than two hectares of mangroves (IUCN, 1991). Only about 10% of the flora is indigenous, and only one endemic species, a species of *Phyllanthus*, has been reported (Dahl, 1986). Manner *et al.* (1984, 1985) identify two indigenous forest types which once dominated the central plateau. The first type, dominated by *Ficus prolixa*, is found on the escarpment and on limestone outcrops or eroded hill crests in the interior. The second type, which probably covered more than 90% of the plateau before mining, is dominated almost entirely by *Calophyllum inophyllum*. Stands of *Pandanus* species are occasionally interspersed amongst both forest types, but are reported to have been deliberately planted for their edible fruits.

Phosphate mining has had a drastic effect on the topography and vegetation of the plateau. Before mining can begin, the land is stripped of vegetation, and the topsoil and contaminated phosphate are scraped off, thereby exposing the phosphate deposits. By 1989, some 75% of the surface area of the island had been mined, and over 90% of the plateau forest had been destroyed, leaving less than 200 ha of forest intact (SPREP, 1989). Virtually no attempt has been made to rehabilitate any of the mined areas, and by the end of this century, an estimated 80% of the total land area (1,760 ha) will have been transformed into pitted, barren wastelands with scattered coral pinnacles (Manner *et al.*, 1984).

This destruction of the island's indigenous forest and scrub poses a serious threat to the survival of Nauru's one endemic bird species, the Nauru (or Finsch's) Reed Warbler (*Acrocephalus rehsei*). This is currently listed in the IUCN Red List of Threatened Animals in the 'Endangered' category (IUCN, 1990). Its present status is unknown, but island residents reported that it could still be found in the remaining brushy areas on the island in 1983 (Pratt *et al.*, 1987).

Dahl (1980 and 1986) has recommended that efforts be made to establish protected areas, including reefs and important cultural sites, and that any remaining forested areas be protected from further mining. However, as the phosphate deposits are the only significant resource on the island, commercial development of phosphate mining has taken priority over the conservation of the natural environment. The Republic of Nauru has made it clear that it will not consider any conservation measures in the remaining phosphate bearing areas.

Concern has recently been expressed that continuing denudation of the central plateau for phosphate mining may cause long-term micro-climatic changes, and restoration of mined land is now a key environmental issue. A Commission of Inquiry into the Rehabilitation of the Worked-Out Phosphate Lands has been established to look at the question of rehabilitation and its cost and feasibility (UNEP/IUCN, 1988). Certainly, the Republic of Nauru could choose to invest some of the capital derived from phosphate mining to rehabilitate the central plateau, through the levelling and breaking up of the pinnacles, the importation of topsoil and the

planting of appropriate tree species (Manner *et al.*, 1985).

Summary of Wetland Situation

There is very little surface water on the Nauru's highly permeable terrain, much the largest permanent water body being Buada Lagoon. This is a brackish sunken lagoon, some 3-4 ha in extent, surrounded by a swampy area. It is situated near the centre of the limestone plateau, and has a salinity of 2 p.p.t. and a pH of 8. Ranoemihardjo (1981) lists one other lagoon (at Anabar), a small brackish lagoon with a salinity of 10 p.p.t., and 28 tiny fresh to slightly brackish ponds, most of which were formed in bomb craters during World War II.

Many of the ponds and the two lagoons are used for the rearing of milkfish (*Chanos chanos*). Fry are collected from the reef at low tide, acclimatized for 2-3 weeks, and then released into the ponds and lagoons. Growth rates have, however, been slow, partly because of competition with *Tilapia* and partly because of the insufficiency of natural food and overcrowding (Ranoemihardjo, 1981). *Tilapia mossambica* was introduced into the island in about 1960 to feed on mosquito larvae, and rapidly became abundant in the lagoons and ponds. At the request of the Republic of Nauru, a *Tilapia eradication* programme was implemented by FAO in 1979 and 1980. This involved poisoning the lagoons and ponds with the highly toxic fish poison rotenone (Ranoemihardjo, 1981). Both of the lagoons and most of the ponds are also used as dumping grounds for rubbish.

There are two other wetland systems of note in Nauru. The first is a series of tiny wetlands (0.25-0.33 ha in extent) along the inner edge of the reef lagoon at the base of the limestone escarpment. These are small brackish marshes which sometimes dry out completely. They are virtually unused by the islanders, and remain in an almost unspoiled condition. The second system is a small patch of mangroves, probably less than two hectares in extent, on the island's northeast coast. This very isolated stand of mangroves, of unknown origin, contains only a single species, *Bruguiera gymnorhiza* (Woodroffe, 1987). The mangrove fruits were apparently once used as a food by the Nauruans.

The only significant water resources available for human consumption lie underground. Traditionally, the inhabitants used groundwater accessible in wells and caves in the karst. However, these supplies are dwindling, apparently as an indirect result of the mining activities (SPREP, 1989). During prolonged droughts, fresh water is shipped to the island in empty phosphate ships.

Nauru's marine systems have been described by UNEP/IUCN (1988). There is no true reef and no lagoon; rather, the island is surrounded by an intertidal reef platform, some 150-200 m wide, cut into the original limestone of the island and typified by the presence of numerous emergent coral pinnacles. The platform is dominated by large yellow-brown algae and little or no coral growth occurs on the reef flat. Coastal waters are relatively unpolluted, although there may have been one or two instances of silt accumulating on some parts of the reef flat.

Wetland Research

The only research specifically related to wetlands has focused on the development of fish culture in the island's ponds and lagoons (Ranoemihardjo, 1981). Soil surveys have been undertaken by John Morrison of the University of the South Pacific, while Manner *et al.* (1984, 1985) have studied the natural vegetation of the plateau and plant succession after phosphate mining.

Wetland Area Legislation

There is no legislation relating specifically to the inland aquatic systems, and indeed no legislation concerning the conservation of terrestrial ecosystems. No protected areas have been established, and none is proposed (IUCN, 1991). The Marine Resources Act 1978 makes provisions for the exploitation, conservation and management of fish and aquatic resources in territorial waters and the exclusive fisheries zone. In general, customary rights over the reefs restrict over-harvesting, and allow the recovery of exploited resources, especially on the reef slopes (UNEP/IUCN, 1988).

The Republic of Nauru is a member of the South Pacific Regional Environment Programme (SPREP) and has signed, but not yet ratified, the Convention for the Protection of the Natural Resources and Environment of the South Pacific (SPREP Convention) and the Convention on Biological Diversity. It is not, however, as yet a party to the World Heritage Convention, Man and the Biosphere Programme or Ramsar Convention.

Wetland Area Administration

Not applicable.

Organizations involved with Wetlands

The Department of Island Development and Industry is the government body concerned with the island's natural resources, and has been involved with the development of fish farming in the lagoons and ponds. However, no specific government entity is directly assigned to take charge of the inland aquatic habitats or the fishery which they support.

WETLANDS

Only one of Nauru's tiny wetlands would appear to be of international importance on the basis of the Ramsar criteria, namely Buada Lagoon. The following site account has been compiled from the literature.

Wetland Name: Buada Lagoon

Country: Nauru

Coordinates: 0°32'S, 166°55'E

Location: near the south end of the island of Nauru, approximately 1.3 km from the coast.

Area: 3-4 ha.

Altitude: Near sea level.

Overview: An enclosed brackish lagoon in the interior of a raised coral limestone island.

Physical features: A small, brackish, sunken lagoon, some 3-4 ha in extent, surrounded by a swampy area. The lagoon is situated in a depression near the southwest end of Nauru's limestone plateau, and has a salinity of 2 p.p.t. and a pH of 8 (Ranoemhardjo, 1981). The water is slightly greenish in colour. The lake is fed by local run-off, principally during the monsoon season from November to February.

The climate is tropical, with an average annual rainfall of about 2,000 mm. There are, however, wide fluctuations in rainfall from year to year, and droughts are not uncommon.

Ecological features: No information is available on the aquatic vegetation. The natural vegetation on the surrounding plateau comprises plateau forest dominated almost entirely by *Calophyllum inophyllum*. However, most of this forest has now been cleared for phosphate mining, leaving barren wastelands with scattered coral pinnacles (Manner (Manner *et al.*, 1984 & 1985).

Land tenure: Customary ownership.

Conservation measures taken: None.

Land use: The lagoon was formerly used for the rearing of milkfish (*Chanos chanos*). Fry were collected from the reef at low tide, acclimatized for 2-3 weeks, and then released into the lagoon. Growth rates were reported to be slow, partly because of competition with *Tilapia* and partly because of the insufficiency of natural food and overcrowding (Ranoemihardjo, 1981). There is some small-scale cultivation of fruit trees, *Pandanus*, breadfruit, bananas and vegetables in the swampy area bordering the lagoon.

Disturbances and threats: *Tilapia mossambica* were introduced into the lagoon in about 1960 to feed on mosquito larvae. They increased rapidly and were thought to be limiting production of milkfish through competition. At the request of the Republic of Nauru, a *Tilapia* eradication programme was implemented by FAO in 1979 and 1980. This involved poisoning the lagoon with the highly toxic fish poison rotenone (Ranoemihardjo, 1981). The lagoon is used as dumping grounds for rubbish.

Hydrological and biophysical values: No information.

Social and cultural values: No information.

Noteworthy fauna: No information.

Noteworthy flora: No information.

Scientific research and facilities: Some work has been carried out on the development of fish culture in the lagoon (Ranoemihardjo, 1981).

Management authority and jurisdiction: No information. The Department of Island Development and Industry has been involved with fish farming in the lagoon.

References: Manner *et al.* (1984 & 1985); Ranoemhardjo (1981); SPREP (1989). Reasons for inclusion: id. A very isolated and unusual brackish lagoon in the interior of a raised coral island.

Source: See references.

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