DISCLAIMER : Translated from the original Spanish for the Ramsar Bureau (August 2002), and provided to Wetlands International for use in the Ramsar Database. Translation not checked against original by Ramsar Bureau.

Information Sheet on Ramsar Wetlands

1. Date this sheet was completed/updated: June 2000

2. Country: Nicaragua

3. Name of wetland: Cayos Miskitos and the Adjacent Coastal Strip

4. Geographical coordinates:

    14º 23' North latitude
    82º 46' West longitude

5. Altitude: 0–130 metres above sea level on the coastal lowlands and between 0 and 600 metres above sea level on the intermediate plateaux.

6. Area: The area declared the Marina Cayos Miskitos Biological Reserve and the Adjacent Coastal Strip covers approximately 85,000 hectares. The area with wetlands in the reserve can be classified as follows: areas subject to flooding, gallery woodlands, broadleaf forests, conifer forests, lakes and estuaries.

7. Overview:

The area of the has three types of wetlands as defined by Dugan (1992).

Paludal systems: These are composed mainly of areas subject to flooding and flooded areas. The dominant vegetation of this system is shrub (Melastomaceae, Cyperaceae and others). The use that the indigenous population gives to this area is for hunting, small-scale use of minor forest species for firewood and grazing of cattle. There are also floodplains in this area dominated by pines (*Pinus caribaea*). This is the southern limit of this type of ecosystem, which is subject to flooding in the northern hemisphere.

Riparian systems: These include the gallery woodlands that exist on the banks of the main rivers in the wetland, such as the Coco, Kukalaya, Layasiksa, Likus, Wawa and Ulang rivers. Broadleaf woodlands and conifers present in this system are prolongations of the woodlands of this type located in the higher parts of the region. These forests are currently used intensively.

Estuarine systems: In this system are the Bihmuna, Karata, Pahra and Wauhta lakes, among the largest. These lagoons are bordered by mangrove forests in their natural state with a minimum of human intervention. Of outstanding importance is the red mangrove (*Rhizophora mangle*), the dominant species. Also in this system are coral reefs, marine grasslands and keys located in the marine area of the wetland. The

lagoons in this system are the main centres for exploitation of fish (fish with scales and shrimp). Small-scale fishing is practiced by the local Indians in the surrounding communities as their main economic income for these communities. In the marine area, both small-scale and industrial fishing take place. Commercial fishing is done by Nicaraguan and foreign boats.

Within the proposed wetland, there is a diversity of coastal marine environments scattered among each other: 10 of the 11 types described for marine wetlands, eight types of freshwater wetlands and one type of artificial wetland. They are not currently disturbed by man and maintain an almost unaltered natural equilibrium, which makes it among the biologically richest coastal areas and marinas in tropical America. In the Cayos Miskitos Reserve is located one of the largest areas of marine grasses in the Caribbean scattered among coral reefs, which are in an almost pristine state (Marshall, 1992).

Within the wetland, there are:

> Feeding areas for the green turtle (*Chelonia mydas*), hawksbill turtle (*Eretmochelys imbricata*), American manatee (*Trichechus manatus*) and black-bellied whistling-duck (*pichete común*) (*Dendrocygna autumnalis*).
>
> Areas of reproduction for dolphins (*Stenella* sp.), *robalos*, prawns, *cigueñones*, etc.
>
> Breeding areas for the green turtle (*C. mydas*), American manatee (*T. manatus*) and dolphins (*Stenella* sp.).
>
> Breeding areas for shrimp, *meros, pargos* and *robalos*.
>
> Habitats of rare or endangered species, such as the green turtle (*C. mydas*), hawksbill turtle (*Eretmochelys imbricata*), black corals (*Antipatharia* sp.), *robalo*, herons, storks, ocelot (*Leopardus pardalis*) and others. Also among the flora are found several species of orchids in addition to the bigleaf mahogany (*Swietenia macrophylla*) and *cedro real*.

8. Wetland type: The area proposed as a Ramsar site meets several criteria according to the Ramsar system of classification.

Marine and coastal wetlands

> A: Permanent shallow marine waters in most cases less than six metres deep at low tide; includes sea bays and straits.
> B: Marine subtidal aquatic beds; includes kelp beds, sea-grass beds, tropical marine meadows.
> C: Coral reefs.
> E: Sand, shingle or pebble shores (*guijarros*); includes sand bars, spits and sandy islets; includes dune systems and humid dune slacks;
> F: Estuarine waters; permanent water of estuaries and estuarine systems of deltas;
> G: Intertidal mud, sand or salt flats (*saladillos*);

H: Intertidal marshes; includes salt marshes, salt meadows, saltings, raised salt marshes; includes tidal brackish and freshwater marshes.
I: Intertidal forested wetlands; includes mangrove swamps, nipah swamps and tidal freshwater swamp forests;
J: Coastal brackish/saline lagoons; brackish to saline lagoons with at least one relatively narrow connection to the sea;
K: Coastal freshwater lagoons; includes freshwater delta lagoons.

Inland wetlands

M: Permanent rivers/streams/creeks; includes waterfalls;
N: Seasonal/intermittent/irregular rivers/streams/creeks;
P: Seasonal/intermittent freshwater lakes (over eight hectares); includes floodplain lakes;
Tp: Permanent freshwater marshes/pools; ponds (fewer than eight hectares), marshes and swamps on inorganic soils; with emergent vegetation water-logged for at least most of the growing season;
Ts: Seasonal/intermittent freshwater marshes/pools on inorganic soils; includes sloughs, potholes, seasonally flooded meadows, sedge marshes;
W: Shrub-dominated wetlands; shrub swamps, shrub-dominated freshwater marshes, shrub carr, alder thicket on inorganic soils;
Xf: Freshwater, tree-dominated wetlands; includes freshwater swamp forests, seasonally flooded forests, wooded swamps on inorganic soils;
Zg: Geothermal wetlands;
Zk: Karst and other subterranean hydrological systems, inland.

Artificial wetlands

9: Canals for transportation and drainage, ditches;

The dominant types of wetlands at the site are marine coastal and continental.

9. Ramsar criteria: Criteria for representative or unique wetlands

Criterion 1: The wetland contains a representative, rare or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region. It is an especially good representative example of a wetland that plays a hydrological, biological or ecological significant role in the natural functioning of an extensive water basin or coastal system, especially if it is cross-border.

General criteria based on fauna and flora

Criterion 2: It supports vulnerable, endangered or critically endangered species or threatened ecological communities.

Criterion 3: It supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.

Criterion 4: It supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.

Specific criteria based on waterfowl

There is no field information that permits application of this criterion, although it is assumed that criterion 5 applies.

Criteria based on fish

Criterion 7: it supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity.

Criterion 8: It is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.

The most significant criterion is criterion 1 because Cayos Miskitos is geographically on the widest part of the continental shelf of Central America in the Caribbean Sea. This area has two parts: a continental portion and another insular. The insular part is in the marine portion of the Caribbean with the largest area of marine Spermatophyte. For this reason, this biogeographical region is considered unique (Estudio Ecorregional del Caribe, TNC). In addition, it represents a mixture of mixed coastal ecosystems including large coral formations, systems of keys and small islands and mangroves, forming a mosaic of marine and coastal ecosystems with systems of coastal continental wetlands. This creates an environment of highly diverse ecosystems, allowing it to conserve many endangered or threatened species such as the sea turtle (*Chelonia mydas*). This is the most important grazing area and has the largest population of the rest of turtles because of the propitious area formed by coral reefs. In addition, it is located at the end of a system of currents of the sub-basin in the southern Caribbean of Central America, which is a key ecosystem for repopulation and the genetic health of many marine species. In addition, it offers an important habitat for reproduction and growth of many species of ecological and economic importance both locally and internationally.

10. Map of site included? Please tick yes -or- no

11. Name and address of the compiler of this form:

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12. Justification of the criteria selected under point 9, on previous page:

Criterion based on unique or representative characteristics

Criterion 1: Cayos Miskitos is located geographically in the widest part of the Central American continental platform on the Caribbean Sea. This area is characterized by a continental part and another insular. The insular part is in the marine part of the Caribbean with the largest area of marine Spermatophyte, making this biogeographical region unique (Estudio Ecorregional del Caribe, TNC). In addition, it represents a mixture of mixed coastal ecosystems including large coral formations, systems of keys and small islands and mangroves. At the same time, because it is located at an extreme of a system of currents of the sub-basin of the southern Caribbean of Central America it is a key ecosystem for the repopulation and genetic health of innumerable marine species.

The continental area is characterized by having a large area subject to freshwater flooding with a large capacity for capturing water during the rainy season and preventing flooding. It is important source of water for conservation of coastal aquifers, preventing salinization of soils and guaranteeing freshwater during the dry season. The coastal area has freshwater flood lagoons, in the form of coastal lagoons. All of them are important for the hydrology and development of important critical reproductive events in the life cycle of the species of fish, crustaceans and molluscs of biological and commercial importance.

Criteria based on the importance for plants and animals

Criterion 2: The Cayos Miskitos and Adjacent Coastal Strip Wetland protects many endangered and vulnerable species such as the green turtle (*Chelonia mydas*), American crocodile (*Crocodilus acutus*), great curassow (*Crax rubra*), ocelot (*Leopardus pardalis*), jaguar (*Panthera onca*), long-tailed otter (*Lontra longicauda*), American manatee (*Trichechus manatus*), jabiru (*Jabiru mycteria*) and Buffon's macau (*Ara ambigua*). Because of this criterion 2 is applicable.

Criterion 3: This area is formed by a mixture of marine and coastal ecosystems with systems of coastal continental wetlands, creating an environment of highly diverse ecosystems. This high biodiversity has great local importance because it is located at the edge of a system of currents in the sub-basin of the southern Caribbean in Central America. This is a key ecosystem for repopulation and the genetic health of countless marine species. In addition, it offers a habitat important for reproduction and growth of many species of ecological importance and economic both local and internationally according to criteria 3 and 4.

Criterion 4: The continental area of Cayos Miskitos has recent fossils and the only records of piñuelo mangrove (*Pelliciera rizhophorae*) on the Caribbean coast, which was thought to be restricted to the Pacific Coast until a few years ago.

Criteria for waterfowl

Criterion 5: There are a large number of partial lists of bird species in the area of Cayos Miskitos. Several species of waterfowl, such as *Jabiru mycteria*, are important. However, there is no field information making it possible to apply this criterion, although it is assumed that criterion 5 applies.

Criteria based on fish

Criterion 7: The area of Cayos Miskitos includes two species of freshwater dolphins (marine mammals of the genus estuarine dolphin (*Sotalia fluviatilis*) that are of great importance because of its uninterrupted distribution in the region. In addition, the area is of great importance for fish of commercial value in the genus *pargo* (*Ludjanus* spp.), *mero* (*Epinephelus* spp.) and *robalo* (*Centropomus* spp.), whose populations are believed to be migratory. It is assumed that they lay eggs in the lagoons in the area and that they are shared with the populations of Costa Rica and Honduras, where there are probably many breeding areas.

Criterion 8: In addition, large number of species of coral reefs with potential commercial value associated, because they are coastal lagoons, the coral reefs and marine areas of Spermatophytes plus mangroves. All these are considered important areas for reproduction (criterion 8). Other endangered species, such as species of shark are also of great importance in the reserve, in particular *Rhizoprionodon porosus*, which is not very common in the Caribbean.

13. General location:

The Cayos Miskitos and Immediate Coastal Strip Wetland is located in the Región Autónoma del Atlántico Norte (RAAN) of Nicaragua in Central America. The most important city in the area is Bilwi, which is the administrative centre of the municipio of Puerto Cabezas and at the same time the main city in the Región Autónoma del Atlántico Norte.

14. Physical features:

The RAAN has an area of 32,159 square kilometres with an estimated population of 175,405 inhabitants (SILAIS 1995) and borders on the north with Honduras, on the south with the RAAS, on the east with the Caribbean Sea and to the west with the departments of Matagalpa and Jinotega (annex 3).

Geology: The geological province that characterizes the area according to INETER includes the province of the flatlands of the Atlantic Coast within which are included rock formations from the Quaternary. These include formations of Bragman Bluff and alluvial deposits.

Origin: The proposed wetland is of natural origin.

Soils: The soils of this area normally have low fertility because of the rigorous climatic conditions; chiefly precipitation that has leached most of the nutrients from the soil. In the low areas, the soils show conditions of severe hydromorphism with frequent and prolonged flooding and a permanently high water table. During the rainy season, it can be seen that the water table in these low areas remains at the soil surface, which favours the formation of a layer of turbid water.

Climate: The dominant climate of the region is wet tropical, with annual precipitation between 2500-3300 millimetres, an annual average of 2740 millimetres. There are two seasons a year: the rainy season between May and January, during which the heaviest precipitations occur in July. The dry season is between February and April. Temperature ranges between 24 and 26º C. During the dry season, temperatures can reach a high of 34º C, and in December lows down to 16º C have been recorded.

Physiography: In the RAAN, there are three defined physiographical areas: lowlands (coastal area), intermediate flatlands (central area) and hills and mountains (western area). The proposed RAMSAR site is located between the coastal lowlands and the intermediate flatlands where the relief can be characterized as follows:

Low plains: These are areas found parallel to the coastline at between 0 and 130 metres above sea level, occupying land that is permanently or seasonally flooded, with hilly relief and moderate slopes of 0 to 1 per cent. Intermediate plains are inland areas parallel to the low flatlands, with elevations of 130 to 600 metres above sea level, with moderate relief, wide flatlands (*llanos*), mountains and isolated hills with hilly relief and soft inclinations with slopes of 0 to 15 per cent.

15. Hydrological values:

In Nicaragua, the hydrographical basins can be grouped into two large watersheds: the Atlantic watershed (Caribbean Sea) and the Pacific slope. According to criteria of

INETER, Nicaragua can be divided into 21 hydrographical basins of which eight drain into the Pacific and 13 towards the Atlantic. Of these, the proposed Ramsar site is influenced by three large basins: Cuenca del Coco, Cueca de Kukalaya and Wawa and the Cuenca de Prinzapolka. Each of these receives strong rivers and tributaries that empty into approximately 24 lagoons and coastal estuaries that are located at the site or towards the Caribbean Sea. The proposed areas are of great importance with regard to the hydrological values because they supply the recharging of aquifers, control of flooding, capture of sediments, coastal stabilization and transportation, among others.

16. Ecological features:

Life areas: According to Holdridge's classification system, taking as parameters biotemperature, precipitation, altitude above sea level and air temperature, the proposed area in located within the life area that corresponds to the very humid subtropical hot forest with broadleaf evergreen forests.

17. Noteworthy flora:

The proposed wetland has extensive broadleaf forests on the banks of the main tributaries, conifers (*Pinus caribaea)* and mangrove (*Rhizophora* sp.) in the adjacent coastal strip. Among the broadleaf trees, the broad-leaf mahogany (*Swietenia macrophylla*) and *cedro real* (*Cedrela odorata*) are the species of greatest commercial value and are, therefore, endangered. In the conifer forest (*P. caribaea*), there is a high incidence of forest fires that affects the water level in some of the rivers in this wetland. In the mangroves that surround the coastal strip and the lagoons, red mangrove (*Rhizophora mangle*) dominates. It is a species that in some sectors of the wetland is used to a lesser degree for obtaining tannin and charcoal (annex 4).

18. Outstanding fauna

The fauna in the area is very rich in biodiversity and includes reptiles, birds, mammals, fish, crustaceans, etc. Among the species of large fauna of commercial value in the coastal strip, there is the prawn (*Penaeus* spp.) and lobster (*Panulirus argus*), which are exported by established dealers in Bilwi. Endangered species, such as the green turtle (*Chelonias mydas*), hawksbill turtle (*Eretmochelys imbricata)*, American manatee (*Trichechus manatus*), freshwater dolphin (*Sotalia fluviatilis*), *cuajipal* (*Crocodylus fucus*) and others. In the forest area, there are the ocelot (*tigrillo*) (*Felis pardalis*) and macaws (*Ara* spp.) (annex 4).

19. Social and cultural values:

The proposed wetland provides important services to society such as the supply of food, firewood, timber, water, transportation and recreation. The main economic income of the local inhabitants is from fishing. In addition to a rich potential natural resources, it also has the wealth implied by the culture of the Indians that live in the area. This culture is reflected in the respect and cosmic vision towards "Madre Tierra", in the harmonious relationship of the local inhabitants with plants and animals and their environment. There are many legends of the spirits that watch over the

water, forests and harvests. This is also reflected in the dances, music, poesy and culinary art.

20. Land tenure/ownership of:

At the site:

Government: includes the continental platform that is within the area.

Communal: This is most of the area, because the communities are owners of most of the area proposed.

In the surrounding area: The land tenure system is similar.

21. Current land use:

At the site: Currently, there are the following land uses: forest, shifting subsistence agriculture and grazing.

In the surrounding area: Land use is similar to that of the proposed site. In this area, there is intensive use of the forest, which influences considerably soil erosion. This implies the carrying away of a large amount of sediments towards the lagoons and the coastal area affecting the fauna and flora of these habitats.

22. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land use and development projects:

Pressure of demand for the external market for several fisheries products endanger the quality of the marine and estuarine ecosystems in the wetland. In the forest areas, intensive use of the forest resource causes soil erosion, which leads to the erosion of large amounts of sediment in the rivers towards the lagoons and the coastal area of the wetland, negatively affecting the biophysical conditions of the ecosystems.

There is a gap in the laws, decrees and regulations created and adopted in order to protect the natural resources and current uses given to it by civil society because of the deep economic crisis, lack of economic alternatives and diversification of use of the resources and ignorance of laws, decrees and regulations established by the government.

23. Conservation measures taken:

The national government has designated the site as a protected area, by presidential decree 43-91. Although a general management plan for the reserve has been prepared. Currently, there are few programmes included in the plan that are being implemented.

Declaration of ban on the hunting of species of endangered or vulnerable fauna according to the CITES Convention.

24. Conservation measures proposed but not yet implemented:

Management plan for the reserve;
Periods of banned hunting;
Regulated use of the Wauhta and Karata lagoons.

25. Current scientific research and facilities:

Currently, there is no research in the area. As for infrastructure, the Centro Inter-Universitario Moravo of the Bluefields Indians and Caribbean University (CIUM-BICU) has infrastructure that has facilitated development of processes for management of natural resources in the region.

26. Current conservation education:

At the present time, there are no environmental education activities in the proposed area.

27. Current recreation and tourism:

Tourism is a new activity, which has attracted the attention of the Instituto Nicaragüense de Turismo in the area. The Asociación de Mujeres Indígenas de la Costa Atlántica (AMICA) recently began an ecotourism project for training local women in culinary arts, ecotourism guides and management of hotels. Within the wetland, there are sites that are used for recreational activities (resorts) among these are la Bocana, la Bocanita, Kamla, Krukira and Tuapi.

28. Jurisdiction:

Territorial*:* The Cayos Miskitos and Adjacent Coastal Strip Wetland involves the municipios of Waspam, Puerto Cabezas and Prinzapolka.

Administrative: It is part of the System Nacional de Areas Protegidas (SINAP) of MARENA. Currently, MARENA is promoting a process of decentralization towards an administration of shared management, situation in which NGOs such as ALCALDIAS, AMICA, FADCANIC and MIKUPIA, the regional government and council, community structures, universities (CIUM-BICU, UCA) have become involved in management activities.

29. Management authority:

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30. References:

Annex 1. Declaration of the Miskitos and the Adjacent Coastal Strip Marine Biological Reserve

Annex 2. Map of the Miskitos and the Adjacent Coastal Strip Marine Biological Reserve

Annex 3. Map of the Miskitos and the Adjacent Coastal Strip Marine Biological Reserve

Annex 4. List of the main endangered species according to CITES found at the proposed Ramsar site

Annex 5. Census of the Population of Communities in Miskitos and the Adjacent Coastal Strip Marine Biological Reserve