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## Information Sheet on Ramsar Wetlands

1. Date this sheet was completed/updated: 23 April 2001

2. Country: Ecuador

3. Name of wetland: Laguna de Cube

4. Geographical coordinates:

0° 23' 48" North latitude  
79° 38' 52" West longitude

5. Altitude: 350 metres above sea level

6. Area: 112.67 hectares

7. Overview:

This site is a permanent continental lake located on the southeastern edge of the Mache-Chindul cordillera in the southern part of the Chocó bioregion. Laguna de Cube forms a lacustrine ecosystem composed of a year-round stable body of water, a large area of marsh and floodplain of 112.67 hectares. Laguna de Cube is the only continental wetland on the Ecuadorian coast in the coastal mountain ranges (350 metres in altitude). Because of this, it is of hydrological importance for the region and at the same time maintains a unique biotic community, characteristic of the Chocó and Andean bioregions that should be preserved.

The lake is located in a large depression surrounded by hills with heterogeneous natural and modified landscape. In the lower part, there are open fields with a few scattered trees. At the higher elevations, there are modified forests and more-or-less dense primary forests. In the area surrounding the lake, there are signs of small flat areas and valleys with pasture and subsistence crops. A large human settlement around the lake has taken the decision to manage the wetland in order to ensure its conservation.

8. Wetland type: O

9. Ramsar criteria: 1 and 3

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:

This is a lacustrine ecosystem in good conservation status with a stable and well-structured biotic community of species in several taxons at high trophic levels. There is wide biological diversity at the species level and a variety of aquatic, semi-aquatic and floodable habitats in which many species live, some of them endangered or endemic. Studies carried out by Briones (1997) and Fundación Natura (2000) describe outstanding physical and chemical characteristics and important hydrological values.

Good water quality makes it possible to maintain a large biotic community. Botanical and zoological studies have confirmed the high quality of the habitat, including diversity and important species and key ecological processes for the survival of the biotic community. This is the wetland with the highest classification on the north and central coast of Ecuador and, therefore, it has a high priority for conservation (Briones, 1997).

13. General location:

Laguna de Cube is located in the province of Esmeraldas, canton of Quinindé, parish of Rosa Zárate, in the district of La Laguna, 2.5 kilometres for the site called La Y, located 40 kilometres from the city of Quinindé, forming part of the forests on the western foothills of the coastal Mache cordillera. It is within the Reserva Ecológica Mache-Chindul (REMACH).

Its UTM coordinates are 1043925 North and 650768 East at an altitude of 350 metres (the dock on the lake). Its average annual temperature ranges between 23° and 25° C, and it receives an average annual precipitation of 2000 to 3000 millimetres (Cañadas, 1983). According to Cañadas, it belongs to the coastal wet tropical region and the ecological formation of wet tropical forest (bhT). In the plant classification system for continental Ecuador, Sierra et al. (1999) classifies it in the coastal region, northern subregion (wet), lowlands sector, lowland lacustrine grassland plant formation.

#### 14. Physical features:

The total area of the wetland and the lake is 112.67 hectares, of which 21.41 hectares form the body of water and 91.26 hectares the wetland, according to data provided by a working group from Fundación Natura and the Ministry for the Environment in November 2000. There are several swamps that feed into the lake, but only one that drains from the southern part of the lake. This is the Río Colorado Turbio, which downstream takes the name of Colorado Claro and becomes one of the tributaries of Río Cube.

The temperature is 25° C, and annual precipitation is 2000 millimetres.

The water quality (W.Q.I. 0.66) corresponds to water of average quality for human consumption. However, it cannot be consumed directly because of the presence of coliform faecal bacteria. There is a high level of ammonium, although not to the point of being toxic, which is a result of the decomposition of organic material. The physical and chemical qualities of the water with regard to dissolved oxygen and Chemical Oxygen Demand sustain an important biotic community (see annex describing water quality).

#### 15. Hydrological values:

This wetland forms part of a hydrological subsystem of many tributary swamps. Río Colorado Turbio, a tributary of the Río Cube, begins here, then becomes Río Viche, a tributary of Río Esmeraldas. This wetland offers environmental services related to conservation and management of the micro regional hydrological system, forming an important freshwater reserve in the eastern part of Mache. At the same time, it forms a natural water reservoir for controlling flooding of the lowlands.

#### 16. Ecological features:

Laguna de Cube is a wetland belonging to a large lacustrine biome. Using the Ramsar classification for wetlands (Davis, 1994), the area can be divided in a flooded area and a floodable area.

The flooded area: This is a freshwater lentic ecosystem that remains flooded year round and that can be divided into three sub-areas:

- Coastal sub-area with rooted vegetation;
- Limnic sub-area of open water with floating hydrophilic vegetation;
- Deep sub-area at the bottom of the lake.

There is a range from shallow shore areas to deep water in the centre of the lake. Water level varies and with it the size of the lake. This area is located in the central and western part of the lake and forms the habitat for populations of *Caiman crocodylus*, *murciélago pescador* (*Noctilio leporinus*) and several species of large aquatic birds listed in paragraph 18 of this sheet.

The floodable area: The floodable area is a wetland ecosystem, an area of seasonally flooded floodplain (grasslands). This area varies, especially during winter flooding.

The floodable area is formed by almost all the surrounding area. There is a strip of swamp dominated by Cyperaceae, which in the eastern part of the wetland forms a continuous area, making up a large hydrosere. There is abundant semiaquatic vegetation favourable to the breeding and nesting of waterfowl, some of which is migratory.

#### 17. Noteworthy flora:

Plant species vary in function of the areas of the wetland and are described in the lists in the annex on vegetation prepared by Dávila (2000).

Flooded area: This is the lake, which is covered with water year round.

Vegetation of the permanently flooded area: The macrophytes in the lake are hydrophilic species of the floating aquatic habitat, and along the shores there are grasses and shrubs of semiaquatic or aquatic habitats, all with a low diversity of species but a highly dense population. The study was made during the dry season, and during the winter more species would probably have been identified.

Aquatic lake area, floating aquatic vegetation: This is an area of 21.6 hectares made up of floating hydrophilic plants among which the following aquatic species are found: *lenteja* (*Lemna minuta*) (Lemnaceae) and *lechuga de agua* (*Pistia stratiodes*) (Araceae).

Coastal semiaquatic area, macrophytic and hydrophilic vegetation: The shores of the lake are made up of rooted vegetation of semiaquatic or aquatic habitats distributed in two strata: herbaceous and shrub. Their width varies between 10 and 200 metres. This area is modified, except for the floating islands with an average of three metres of earth or substrata. Here, each species competes for domination of space, forming plant colonies of ferns, Araceae, Cyperaceae and Poaceae, and individual shrubs that try to survive, such as the Arecaceae and Moraceae. These micro communities are moved about constantly by the circulation of the lake's water.

The species that form the associations found on the edge of the lake and the floating islands are *Begonia harlingii* (Begoniaceae), *Cyperus odoratus*, *papiro* (*Cyperus papyrus*), *titora* (*Scyrcpus californicus*) (Cyperaceae), *higerilla* (*Ricinus comunis*) (Euphorbiaceae), *Columnea* sp. (Gesneriaceae), *Paspalum conjugatum*, *P. repens* (Poaceae), *Polygonum hydropiperoides* (Poligonaceae) and on the floating islands *Stenospermation sodiroanum*, *Monstera* sp. (Araceae), ferns such as *Nephrolepis biserrata* (Davalliaceae) and *Telypteris* sp. (Pteridophyta), *Sobralia rosea* (Orchidaceae), *Costus pulverulentus* (Zingiberaceae) and shrubs that reproduce such as *Schefflera sphaerocoma* (Araliaceae), *higuerón* (*Ficus maxima*) (Moraceae) *Marcgraviastrum sodiroi* (Marcgraviaceae) and the palm *Euterpe precatoria* (Arecaceae).

Semiaquatic shrub and tree strata: The shrub stratum has a height of between two and six metres and the trees are between seven and 12 metres. Among the shrub species are the *guarumo* (*Cecropia* sp.), *Pouroma* sp. (Cecropiaceae), *paja toquilla* (*Cardulovica palmata*) (Cyclanthaceae), *Banara guianensis* (Flacourtiaceae), *Ficus maxima* (Moraceae), *Calliandra angustifolia* (Mimosaceae), *sapán de paloma* (*Trema*

*micrantha*), *Celtis schippii* (Ulmaceae) and among the trees there are the palm *Iriartea deltoidea* and *Euterpe precatoria* (Arecaceae), which form large associations.

Flooded area: This wetland has been used mostly for agriculture and livestock-raising and is formed primarily of grasslands and areas of maize in the summer and rice during the winter.

Plant strata in the flooded area: There are herbaceous species between 10 centimetres and two metres tall. The following species have been identified: *pasto* (*Cynodon dactylon*), *Paspalum conjugatum*, *cana guadua* (*Bambusa guadua*) (Poaceae), *paja toquilla* (*Cardulovica palmata*) (Cyclanthaceae), *higuerilla* (*Ricinus comunis*) (Euphorbiaceae), *Banara guianensis* (Flacourtiaceae), *Dendropanax caucanus* (Araliaceae), *Calathea lutea* (Maranthaceae) and *Mikania micrantha* (Asteraceae).

The tree stratum is covered with epiphytes, such as bromeliads, bryophytes, orchids and climbers such as *Drymonia serrulata* (Gesneriaceae). Among the palms are the *pambil* (*Iriartea deltoidea*), *cade* (*Phytelepas aequatorialis*), *mocora* (*Wettinia quinaria*), *palma real* (*Attalea colenda*) (Arecaceae), *boya* (*Ochchroma pyramidale*) (Bombacaceae), *Cordia polyantha* (Boraginaceae), *Calliandra angustifolia*, *Inga edulis*, *Zigia coccinea* (Mimosaceae), *Pouteria torta* (Sapotaceae), *Bambusa guadua* (Poaceae) and *Cecropia* sp. (Cecropiaceae).

Shrub and tree strata on dry land and the surrounding area: Among the native and introduced plant species on the strip of land leading out of the wetland are the *mate* (*Crescentia cujete*), *guayacán* (*Tabebuia guayacan*) (Bignoniaceae), *guarumo* (*Cecropia* sp.) (Cecropiaceae), *Senna* sp., *Schizolobium parahybum* (Caesalpinaceae), *niguito* (*Muttingia calabura*) (Elaeocarpaceae), *Banara guianensis* (Flacourtiaceae), *Ocotea javitensis*, *O. olivacea*, *Nectandra obtusata*, *Cariodaphnopsis theobromifolia* (Lauraceae), *Gustavia* sp., *Eshweilera caudiculata* (Lecythidaceae), *Guarea kunthiana*, *Cedrela odorata*, *Carapa guianensis* (Meliaceae), *Inga oerstediana*, *Samanea saman* (Mimosaceae), *Ficus maxima*, *Artocarpus altilis* (Moraceae), *Virola sebifera* (Myristicaceae), *Myrsia* sp. (Myrsinaceae), *Triplaris cumingiana* (Poligalaceae), *Zanthoxylum* sp. (Rutaceae).

## 18. Outstanding fauna

Lake area: Only one species of fish has been identified in the lake: *sardinita* (*Moenkhausia* sp.).

Shore area: The *aquatic* species that live in this area require a substratum of either earth, rocks, plant roots or vegetation for survival. The following species are found here: macro invertebrates in the Gastropoda, Hirudinea, Insecta, Malacostraca and Oligochaeta classes. Among the Insecta are the following genera: *Coleptera*, *Diptera*, *Ephemeroptera*, *Odonata* and *Trichoptera*.

There are a total of 23 species of mammals, 40 species of birds and 11 species of reptiles. Among the mammals, the most important are *Lontra longicaudis* and *Noctilio leporinus*. Among the birds are the *Bubulcus ibis*, *Butorides striatus*, *Cairina moschata*, *Casmerodius albus*, *Ceryle torquata*, *Chloroceryle americana*, *Egretta*

*alba*, *E. thula*, *Jacana jacana*, *Nycticorax nycticorax*, *Pandion haliaetus*, *Phalacrocorax olivaceus* and *Porphyryla martinica* and the reptiles *Caiman crocodylus* and *Chelydra serpentina*.

Three species of vertebrates are listed in CITES Appendix II: *Caiman crocodylus*, *Lontra longicaudis* and *Pandion haliaetus*. *Lontra longicaudis* is a vulnerable species in the IUCN Red Book for Ecuador.

#### 19. Social and cultural values:

In the area surrounding Laguna de Cube, there is a human settlement directly related to the wetland on which it depends for water and shore plants. It is also an area for recreation for local inhabitants and the northern part of the Coast.

Settlements: This includes the towns of La Y de la Laguna and La Laguna. The first centre is concentrated-consolidated, while La Laguna is dispersed-consolidated. The first inhabitants have been there for more than 25 years. The town of La Laguna is located in a depression surrounded by the gullies of La Y, Colorado Turbio and Colorado-Plátano, which is four kilometres long. It is bordered on the north by the Colorado Turbio River, on the south by the Limón and La Y rivers, to the east by Herrera (Cooperativa Sinaí) and to the west with the Calambre marsh. Its area is estimated to be about 500 hectares. The main routes of access are horse trails: La Laguna-La Y, which is two kilometres long, and La Laguna-El Limón. The main large town is Quinindé in the province of Esmeraldas. The community of La Laguna includes 19 farms or plots with 15 families settled for the past 18 years and three owners of farms that do not live there. The founders were the Quiroz y Vélez family who discovered the lake and the surrounding area. The primary school, which is run with community support, was established on 21 May 1984.

In La Y and La Laguna, 42 families live that came from the province of Manabí. This is a very consolidated colonization, and its permanence in the area is continuous and irreversible. The population in the area of direct influence of Laguna de Cube is some 294 inhabitants as of October 2000. Politically and administratively, the area is rural towns or communities belonging to the Quinindé canton. About 90 per cent of the economically active population is active in agriculture, and 10 per cent in trade and services. The productive farming and livestock-raising activities, forestry and trade are the only activities that provide employment.

This wetland is potentially important for the province of Esmeraldas and the northwestern part of the country because of its exceptional scenic, aesthetic and educational values. Visits by Ecuadorian and foreign visitors have increased in the past few years. This has encouraged the local inhabitants to organize and offer ecotourist activities. (See environmental management plan for Laguna de Cube, 2000.)

#### 20. Land tenure/ownership of:

Laguna de Cube is public property. On the shores, there are private plots belonging to families settled in the area before its declaration as a protected area of the Reserva Ecológica Mache-Chindul of which it forms part.

21. Current land use:

The communities in the surrounding area are active in farming and livestock raising and the extraction of wood.

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

The main adverse factors are the extraction of wood from the surrounding land and transformation of the soil, crops and pastures. This produces erosion of the soil towards the shore area of the wetland.

23. Conservation measures taken:

Laguna de Cube is part of the Reserva Ecológica Mache-Chindul, created through resolution of the Executive Director of INEFAN of 9 August 1997. At the present time, the Ministry for the Environment has an administration in the reserve, which through the district of Esmeraldas and an office in Quinindé has a local director who provides monitoring and regulation.

24. Conservation measures proposed but not yet implemented:

Laguna de Cube has a management plan that was prepared for the Ecuador Wetlands Project, carried out under the framework of the WWF-I Living Water Campaign. The environmental management plan for Laguna de Cube has been presented to the Ministry for the Environment and provides a support instrument for administration of the wetland and part of the Reserva Ecológica Mache-Chindul.

25. Current scientific research and facilities:

There is no research programme or facility for medium or long-term research. However, there is interest in research among students in the life sciences in several universities of Ecuador and other countries.

26. Current conservation education:

There is a training and environmental education centre administered by Fundación Natura, which has promoted environmental awareness among the local inhabitants in the surrounding communities since 1993. As a result of this initial education and awareness campaign, the inhabitants in the surrounding area signed an authorization for a request to include Laguna de Cube as a Ramsar wetland of international importance

27. Current recreation and tourism:

There is no organized tourism in the area, although the inhabitants of the city of Quinindé and the local communities use the lake for recreation, but access is limited. Tourism is an activity that is beginning in the area. Laguna de Cube is the main natural attraction and centre for regional tourism being promoted by the local

inhabitants through the Asociación de pobladores del recinto de Laguna de Cube, which is being formed for management of the wetland.

28. Jurisdiction:

This wetland is located in the parish of Rosa Zárate, canton of Quinindé, province of Esmeraldas. Laguna de Cube, which is part of the Reserva Ecológica Mache-Chindul, is under the authority of the Patrimonio Nacional de Areas Naturales Protegidas under the administration of the Dirección de Areas Naturales y Vida Silvestre of the Ministry for the Environment.

29. Management authority:

The body responsible for management of the wetland is the section head of the Reserva Ecológica Mache-Chindul, who reports to the Dirección de Areas Naturales y Vida Silvestre of the Ministry for the Environment. A convention is being drawn up between the Ministry for the Environment and the Asociación de pobladores del recinto La Laguna for management of the wetland.

30. References: