

Information Sheet on Ramsar Wetlands

1. Date this sheet was completed/updated: September 2001

2. Country: Costa Rica

3. Name of wetland: Palo Verde

4. Geographical coordinates:

Horizontals: 279000 – 247000

Verticals: 380000 – 404000

5. Altitude: 0 to 60 metres above sea level

6. Area: 24,519 hectares

7. Overview: Palo Verde is located in one of the few areas where there are small remnants of dry tropical forest. Its seasonal and permanent wetlands form a group of swamps, marshes, lakes, rivers and streams in the lower basin of Río Tempisque. It forms one of the most important areas in Central America that is a breeding and feeding site for a large number of species of migratory and resident aquatic birds and endangered species.

8. Wetland type:

Marine-Coastal: A, G, H, I, J and K

Continental: M, P, R, Sp, Ss, Ts, W and Xf

Artificial: 2, 3, 4 and 9

9. Ramsar criteria: 1, 2, 3 and 4

Criteria that best characterize the site: 1

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 1: A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region. The Palo Verde wetland is included in the Ramsar list as the first wetland of international importance in Costa Rica. The wetlands that make up this site, located in the middle and lower basin of Río Tempisque, play a very important role in the conservation of various ecosystems found there because they are located in a biogeographic region representative of the dry tropical forest. The Río Tempisque basin is an area of great importance for Costa Rica, covering approximately eleven per cent of the country. It is interconnected by an extensive network of rivers with all its characteristics and related systems, such as areas for runoff collection, floodplains, riparian woodlands and the estuary. The Tempisque and Bebedero rivers, which form part of the wetland, are the main river systems in the basin. The flow of these rivers varies considerably because of marked changes in precipitation between the dry and rainy seasons. During the rainy season, many of the rivers overflow. The region stands out because of its cultural importance, with a population that has given great anthropological and historical wealth to the country. Furthermore, there is considerable agricultural and grazing production, and it is the most import tourist area in Costa Rica. Parts of the wetlands that make up this Ramsar site are included in the Palo Verde National Park, which has an area of 19,800 hectares of which approximately 78 per cent of the total area is public land, promoting its functioning as a nature area.

Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, critically endangered species or threatened ecological communities. The seasonal and permanent wetlands of Palo Verde form part of a complex of swamps, lakes marshes, rivers and streams in the lower basin of Río Tempisque. This group of wetlands of the lower Tempisque is one of the most important in Central America for populations of migratory and nesting ducks from North America; for example *pato calvo* (*Anas americana*), common pintail (*pato rabudo*) (*Anas acuta*), *cerceta aliazul* (*Anas discors*), northern shoveler (*pato cuchara*) (*Anas clypeata*), many shorebirds, blue heron (*Ardea herodias*), and the osprey (*Pandion haliaetus*). It is also of great importance for resident species considered endangered by current legislation, such as the jabiru (*Jabiru mycteria*), scarlet macaw (*Ara macao*), American crocodile (*Crocodylus acutus*), jaguar (*Panthera onca*) and the black-handed spider monkey (*Ateles geoffroyi*), among others. There are several forest species with reduced or endangered populations, characteristic of the dry tropical forest, which still conserve several populations within this area.

Criterion 3: A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region. In Palo Verde National Park, together

with other protected wildlife areas in the northern part of Costa Rica, there is a representative example of the only dry tropical forest life area in the country. In Río Tempisque, there is Isla Pájaros, an important site in which 13 species of birds, mainly herons, nest.

Criterion 4: A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions. The Palo Verde wetlands are a site of extreme importance for nesting, resting and wintering for more than 60 species of aquatic birds. The Palo Verde Ramsar site is the main habitat for the jabiru (*Jabiru mycteria*) in Costa Rica, where the characteristics of this species ensure nesting because of the progressive deterioration of the habitat in the surrounding areas. Many bird species that reproduce in other areas of the region benefit from feeding here, especially during the dry season when food decreases in other areas.

13. General location: Palo Verde is located 20 kilometres south of the canton of Bagaces, province of Guanacaste. The main communities located in the area are Bagaces, Bagatzi, Bebedero, Bolsón, Charco, Colorado, Puerto Humo, Raizal, Roblar, Rosario and San Antonio.

14. Physical features:

Geology: Part of this area is formed by an alluvial fill composed mainly of volcanic sediments transported as alluvial sediments by the Bolsón, Cañas, Charco and Tempisque rivers and to a lesser degree by sediments of Cretaceous origin. There are also fluvial, colluvial and coastal deposits, marsh areas and small-scale intrusive processes. Among the geological resources found here are sulphur, clay, diatomite and gold.

Geomorphology: Over all, the land in Palo Verde is a system with poorly developed drainage with a few intermittent streams that drain marsh areas during the rainy season. They have a flat morphology with elevations that range between 0 and 60 metres above sea level forming a sedimentary unit with influence by annual flooding. Several sectors are affected by the influence of the tides, primarily in the lower part of the basin.

Soils: Soil types vary from volcanic in the upper parts to alluvial soils subject to flooding in the lower part, from soils of high fertility to poor soils. There are soils with light textures, for example volcanic, and soils with a heavy structure such as the case of soils very heavy in clay. There are also typically hydro-morphic soils. Several of these have been transformed because of the introduction of farm crops such as sugarcane and rice and extensive cattle raising in several parts.

Climate: Precipitation is between 1500–2000 millimetres/year, which corresponds to the middle and lower parts of the Río Tempisque basin and an average of 1629.8 millimetres/year in the Río Bebedero basin. About 95 per cent of rainfall is distributed over seven months, from May to November. This area has a dry period that lasts five

to six months from December to May. During July and August, there is a decrease in rainfall, called *veranillo*, whose length varies from year to year. As a result, this region has an alternate wet-tropical climate. The average monthly temperature is between 24° and 30° C. Maximum temperatures occur in April and the lowest are from September to December.

Hydrology: The main sources of drainage for this wetland are Río Tempisque and its tributaries: Río Bebedero and Río Charco.

15. Hydrological values:

This forms an area of flat land that is flooded by Río Bebedero and Río Charco. Of greatest importance is Río Tempisque (whose length is 138 kilometres), subjecting all this area to heavy seasonal flooding owing to the combined action of rain and flooding of Río Tempisque and its tributaries, which carry a large amount of sediments. During the dry season, high tides enter the natural channels and flood the system leading to the appearance of a large variety of resident and migratory birds that feed and breed there.

16. Ecological features:

Within this life zone is tropical dry forest, according to Holdridge's life area classification. In this wetland, there are several systems including an intertidal estuary, paludal (marshes), flooded freshwater woodlands and mangroves. There is also evergreen forest located along seasonal streams and around springs. The trees retain their leaves year round and provide refuge for many species during critical periods of the dry season, for example *ojoche*, *tempisque* and *yos*.

17. Noteworthy flora:

A large variety of species are found in this wetland, from grasses associated with aquatic plants to timber-producing species of ecological and commercial interest located along the edges of roads or in small remnant dry forests. These include *peine de mico* (*Apeiba tibourbou*), *guarumo* (*Cecropia peltata*) and *papaturro* (*Cocoloba floribunda*). Among the floating vegetation are *lirio de agua* or *choreja* (*Eichhornia crassipes*), *lirio* (*Nymphaea ampla*) and *lirio* (*Nymphaea lutea*). Among the emergent vegetation is *zacate de suampo* (*Eleocharis mutata*), *Ipomoea carnea*, *dormilona* (*Mimosa publica*), *lechuga* (*Pistia stradioides*), *plantilla* (*Thalia geniculata*) and *tifa* (*Typha domingensis*).

This habitat is of vital importance for aquatic life, especially for migratory and resident bird life, as well as molluscs and clams that provide food for the fauna associated with these environments. Among the main endangered or vulnerable arboreal species are *pochote* (*Bombacopsis quinata*), *guayacán real* (*Guaiacum sanctum*), *cenizaro* (*Samanea saman*) and *corteza amarilla* (*Tabebuia chrysantha*).

18. Outstanding fauna

The area of Palo Verde was one of the largest nesting areas in Costa Rica, but this natural habitat has undergone changes, causing a drastic reduction of the bird colonies. The most representative fauna is the resident and migratory aquatic birds, found primarily in Palo Verde National Park, Laguna Mata Redonda and in the marshes of Corral de Piedra, where they look for nesting, feeding and breeding sites. Among the most important are *pato aguja* (*Anhinga anhinga*), kingfisher (*Ceryle torquata*), spoonbill (*espátula rosada*) (*Platalea ajaja*), egret (*garceta nívosa*) (*Egretta thula*) and stork (*cigüeñon*) (*Mycteria americana*). Among the most common species of aquatic fauna are *piangua* (*Anadara tuberculosa*), *chucheca* (*Grandiarca grandis*), clam (*Protothaca grata*), catfish (*Ariopsis* sp.), *cuminata* (*Arius* sp.), corvina (*Bairdiella* sp.), *pargo colorado* (*Lutjanus* sp.), *róbalo* (*Centropomus* sp.), *jural* (*Caranx* sp.) and the American crocodile (*Crocodylus acutus*). There are also parrots and parakeets. Two species with very small populations are the jabiru (*galán sin aventura*) (*Jabiru mycteria*) and the scarlet macaw (*lapa roja*) (*Ara macao*).

19. Social and cultural values:

Currently, among the main traditional activities carried out in the wetland and the surrounding area are fishing, the gathering of molluscs, ranching, agriculture and hunting. Many of the areas that were formerly used for salt extraction have now been transformed into shrimp farms.

The main communities in the area are Bagaces, Bebedero, Bolsón, Charco, Colorado, Puerto Humo, Raizal, Roblar, Rosario and San Antonio. There are also a large number of cooperatives formed by members of several settlements, working to promote development of their communities. They are usually made up of medium and small producers. Among several of the main economic activities within this wetland are small-scale fishing, gathering of molluscs, small-scale production of handicrafts, ecotourism, livestock raising and agriculture (sugarcane, rice and melon). Tourism has become an important source for development in the area, especially for watching birds and mammals, which has led to the development and growth of small local businesses for transporting tourists.

20. Land tenure/ownership of:

The Palo Verde National Park, Lomas de Barbudal biological reserve, Mata Redonda and Cipanci wildlife reserves are located in this area, which are government property and are administered by the Ministry for the Environment and Energy (MINA E). The Corral de Piedra wetland and the El Tendal wildlife reserve are of mixed ownership (government and private).

In the surrounding area, the land is private property made up of agro-industrial farms and of other owners of smaller size. Several areas of swamp, mangroves and the shores of the navigable rivers (50 metres) are the property of the government. However, the boundaries of these properties have not yet been marked, which limits the conservation possibilities.

21. Current land use:

Implantation and growth of agriculture in the surrounding land has caused significant changes in types of land use, including modification of habitats and the water regime. There is a much larger area in which the wetlands have been converted into agriculture land for growing sugarcane, rice, melons and small parcels for subsistence agriculture. There are also areas that have been converted into pasture for extensive grazing. All these processes require systems of canals and drainage that lead to direct or indirect impact on the wetlands, such as fragmentation of habitats and dumping of waste water into the natural system (Barboza, 1997).

Projects are now being promoted in this area for the protection and management of wetlands through restoration practices.

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

In the past, large areas were deforested in order to extract building materials, firewood and charcoal and for creating grazing pastures or building salt pans. The situation has now changed because many areas are being restored or are under protection within various categories of protected wildlife areas.

In the case of Laguna Palo Verde, which is within the protected wildlife area, management of the wetland has been lost to grazing of cattle for elimination of the vegetation and management of the water system. This type of activity has caused serious problems for the viability of the wetland ecosystems found there. Among the activities that have caused the most damage are forest fires and the lack of available water in several areas during the dry season and growth and expansion of agriculture into the surrounding areas, mostly on the left shore of Río Tempisque. In summary, there are three main problems that affect the wetlands:

(1) Management of the basin

There are problems for management of the Río Tempisque basin, several of which are characteristic of the dry season and others typical of the wet season. This means that these ecosystems are under constant stress. The patterns of water flow are being affected mainly by the artificial reduction of the volume of the river in the dry season because of concessions for irrigating crops and deviation from the natural riverbed through an artificial canal for controlling flooding in the rainy season. Plans for development of infrastructure over the next few years threaten even more the integrity of these wetlands and the ecological processes present there. An example is the wetlands of Corral de Piedra, Palo Verde and Sonzapote, which have suffered large invasions of herbaceous species that have reduced water area and displaced large populations of aquatic birds in the summer. This is because Río Tempisque does not have an ecological flow of fresh water, creating a serious problem for these ecosystems.

(2) Farming

One of the most common practices over the past decades has been destruction of the wetlands located on the shores of Río Tempisque for conversion into farmland. This practice has significantly increased the area available for growing, mainly melons, sugarcane and rice. However, because of environmental phenomena such as those of the past few years with the heavy storms, this land, despite physical changes, is subject to flooding.

Many of these wetlands that have disappeared formerly played the role of retaining excess water during the rainy season and later releasing it little by little, thus avoiding the effect caused by this type of phenomenon. Furthermore, inadequate agricultural practices, without efficient technical control in the areas where there is irrigation have promoted loss of soil and nutrients, which are transported by the drainage canals to Río Tempisque and toward the wetlands. This has led to an increase in sediments in the wetlands and a reduction of outflow, contributing to siltation and reduction of the area of bodies of water, thus affecting several species of fish such as the *guapote* and the *barudo*, which have lost the conditions required for their reproduction. Another important point is utilization of chemicals on crops because their impact is still not known.

(3) Forest fires

Uncontrolled burning is a cause that has over many years altered the overall habitat and biodiversity. The administration of the Palo Verde National Park has decreased this problem through plans for prevention, detection and combating forest fires and grazing in critical areas, with the help of local firemen and educational activities about controlling fires with the local communities. The lack of water during the past few years during the dry season has been considered a serious problem at the regional level, which affects many of the ecosystems present there.

23. Conservation measures taken:

The most feasible measure to promote conservation consists in submitting some areas to a management category and environmental education of the communities in this area and that affect indirectly or directly this basin (see annexe 1). Among the main conservation measures are:

Convention for tripartite cooperation between the national irrigation service, Avenamiento (SENARA), MINAE and the government of Japan for the integrated management of the basin of the middle and lower Río Tempisque;

Laguna Mata Redonda, which is partially protected, is listed in the management category of national wildlife refuge;

Corral de Piedra-Sonzapote wetland is partially protected;

Cipanci national wildlife refuge south of the Palo Verde National Park, including the rias of the Tempisque and Bebedero rivers, with an area of 3,366 hectares and 3,987 square metres.

24. Conservation measures proposed but not yet implemented:

Among proposals made is a study of the rural development project for the Middle Río Tempisque Basin (Preliminary report, 2001).

A proposal to the Ministry for the Environment for declaration of El Tental as a protected area in the category of mixed wildlife reserve. There is also a proposal to designate it a Ramsar site.

25. Current scientific research and facilities:

The following research is being carried out:

Technical studies on the integrated management of the middle and lower Río Tempisque basin;

Study of the cost of degradation of tributaries to estuaries: A case study of the Gulf of Nicoya, Universidad de Costa Rica.

The park has the following infrastructure: Los Negritos administrative centre, Palo Verde administrative centre, La Catalina administrative centre, OET biological station and the Chamoro administrative centre.

26. Current conservation education:

In the area of influence of Corral de Piedra, Mata Redonda and Palo Verde, several environmental education programmes are being carried out for the development and sustainable management of resources with the communities influenced by these areas. These projects are of great importance for equilibrium for development of socio-productive activities. Several of the projects are:

Training for the production of handicrafts in *tifa* fibre (*Typha dominguensis*). The project is focused on using knowledge as part of the culture and management of natural resources, because *tifa* is in some cases considered a pest, although in the future it could be converted into a source of income.

Growing of clams (*Anodonta lateola*) and snails (*Pomasea costarricana*) in tanks on Coral de Piedra. This is an attempt to improve profits from this activity and at the same time reduce pressure on the resource existing in the river and in the wetland.

Construction of an information post and management in the Mata Redonda wetland in order to promote conservation and development of the socio-environmental resources in the ecosystem and communities in the area of influence.

27. Current recreation and tourism:

Although the Palo Verde National Park has a management plan covering the infrastructure for public use of the area, progress in this area has been very basic. This is because the part concerning aquatic birds is one of the main attractions in the park and at this time it is almost impossible to observe them easily because of the reasons already mentioned. However, a very basic flow of ecotourism in the Río Tempisque and Río Bebedero has been developed. It is very easy in these areas to observe birds and crocodiles, which attract a large number of visitors. This area forms the Cipanci National Wildlife Refuge. The number of visitors to Palo Verde National Park is about 5000 persons per year. Once the lagoons are restored, the number of visitors will easily increase exponentially. The park has a camping site and just outside the park it is possible to find a large number of areas for eating and accommodations. The other areas do not yet have services.

28. Jurisdiction:

In the province of Guanacaste, municipality of Bagaces and Nocoja, in the district of Bagaces and San Antonio

29. Management authority:

Sistema Nacional de Areas de Conservación (SINAC)
Area de Conservación Tempisque
Programa Nacional de Humedales

30. References: