

Translation from original approved information sheet. By Dave Fawcett 13th Dec 1994.

Information sheet on Ramsar Wetlands

- 1. Country:** Chile
- 2. Date:** 14th Nov 1992
- 3. Ref no:** 6CL001
- 4. Name and address of compiler:** *see original*
- 5. Name of wetland:** Santuario de la Naturaleza e Investigación Científica "Carlos Anwandter", on the río Cruces, Valdivia.
- 6. Date of Ramsar designation:** 27 July 1991
- 7. Geographical coordinates:** *see original*
- 8. General location:** *Comunas* [=municipalities; Admin 2] of Valdivia and San José de la Mariquina, Valdivia province [Admin 1], Xa region, Chile.
- 9. Area:** 4,877 ha.
- 10. Type of wetland:** M, N, S, T, W and X.
- 11. Altitude:** 0 to 2 m.a.s.l
- 12. Description:**

Bed of the río Cruces and its tributaries, other adjacent flooded areas - the product of land subsidence caused by an earth quake, including forest and ex-grasslands used for livestock herding. Area influenced by tides less than 1 m and seasonal fluctuations in water level, through annual variation in precipitation. Contains the largest nesting area known of the black necked swan and "*cuca*" Heron.
- 13. Physical features:**

The río Cruces lies on the pre-andean tertiary-quaternary "frame", forming part of the watershed of the Cordillera de la Costa (coastal mountain range) which features ancient "slab-stone" (precambrian micaceous schists, lower "*Algonquina*"). Peridotites have penetrated this "slab-stone" series in a winding fashion. The soil is of periglacial origin, in terraces, with pleistocene gravels, volcanic "*tobas*" [?] and a "*toba*" of consolidated sand ("*Cancagua*"). The river bed is constituted of postglacial marine deposits on top of postglacial peat.

The source of the river is in the highest parts of the longitudinal valley, (which runs towards the Andes), in the hills of Voipir and Talcahue (982 masl) to the west of the Villarica volcano and general west to south direction. On its course it meets many streams (about ten) and rivers, just from the city of Loncoche onwards (Leufucade for example). Important rivers are at this stage in their latter and "protected" stretches: Pichoy, Cayumapu, Nanihue and Cudico. The basin has an axial longitude of some 108 km and covers an area of 3,196 km. The río Cruces is 190 km long. Its current width varies between 75m and 3.5 km, along its latter stretches.

The flooded area was created by tectonic processes: the earthquake of 21st May 1960. Fertile plains and temporary meadows [low-lying and fertile] sank at that time to 1.50 m - 2.20 m below water, which left 3.5 km of the river with a width of 1-2 km. The [feasibility-] study of its "batimetry" [?] being made navigable? is still planned, but the flooded areas are no more than 2 m deep. Some sectors of the original course of the river are 7 to 16 m deep.

The river crosses basically rural areas with livestock herding and forestry activity and consequently carries sediments of that origin. It passes by [or through] the cities of Loncoche, Lanco and San José de la Mariquina to practically terminate in the city of Valdivia, from which it must receive untreated urban waste.

The abiotic data of the river include the following. The temperature fluctuates between 8.4 and 25°C (average of 17.6°C). The water is supersaturated with oxygen up to 10% in the months of November and December. It is poor in electrolytes and nutrients (e.g. P04-P), though the sediments are rich in Nitrogen. Saltwater penetrates from the extreme south, through the deep areas, with concentrations between 1.5 to 4.45 parts per thousand. The pH fluctuates between 7.5 in the south to 6.9 in the north, and the conductivity has been less than 100 in the extreme north and greater than 5000 in the final stretch. The Secchi disc can reach more than 4 m in depth.

The general climate of the region corresponds to the Cfsb (Köppen). The area is covered and/or was covered by the rainforests of Valdivia and Chiloé, and is bioclimatically oceanic with mediterranean influence. Precipitation occurs mainly between April and November (8 months), reaching more than 2000 mm/yr.

14. Ecological features:

Usually no more than 20% of the protected area is under water. 40% of the area comprises the temporary floodplain, and the *anegados* [areas liable to flooding], scrublands, and islets together make up the other 40%. This has meant that in the last 30 years the area has become organised into three ecological zones: submerged plants zone; *natantes* [?flooded areas or swamps?]; and emergent vegetation area/ marshland.

Variation caused by the daily tides (i.e. tidal range) is less than 1 m. The entire area is part of an estuarine (more than riverine) complex, owing to this variation in the water level. During the year, owing to the excess of rainfall in winter, the general level can rise by more than half a metre, until spring.

The area is dominated by cryptophytes, making up 62.3% [?-of the vegetation area or numbers of species?], which gives the vegetation its hydrophylic character (i.e. aquatic and marshland). The hemicryptophytes represent 35.1%, and the phanerphytes and camephytes make up the remaining 3%. Amongst the submerged and flooded species *Egeria densa*, *Elodea canadensis*, *Myriophyllum acuaticum* & *Ludwigia poeploides* are dominant. The marsh plants are *Typha angustifolia*, *Phragmites australis* & *Scirpus californicus*, the three presenting great seasonal variation in their *cormo* [?] and biomass. The greatest cover of an aquatic plant comes from *E. densum* (assoc. *Egerietum densum*), accompanied sometimes by *Potamogetum berterioanum*. Amongst the marshland plants *Scirpus californicus* - and, in more terrestrial parts, *Juncus procerus* - are widely dominant. Whilst *E. densa* contributes "necromass" (dead) [as opposed to biomass (live)], *S. californicus* colonise new areas which have favourable conditions and an acceptable water level.

The phytoplankton is rich in species but poor in numbers of individuals, with the diatoms *Asterionella formosa* and *Melosira ambigua* dominating in summer. [noted under *Physical Features in original*]

The natural vegetation communities in many parts which are now flooded, were "hualve" or swamp forest. That was dominated by the *Temo - Myrceugenietum exsuccae* association. In many flooded parts the remains of this association can be observed, with trunks which stand out above the water.

Sheep and cattle herding are more significant in the surrounding area than agricultural crops, and dominates the plains with gently rolling hills.. The forestry activity rises up the steepest slopes in the western region of the basin. There, the native forest has been largely substituted by plantations of *Pinus radiata*.

The fauna is dominated by Chilean coots (*Fulica armillata*, *F. rufifrons* & *F. leucoptera*), followed by black necked swans, with a stable population of up to 3,000 individuals. Amongst the aquatic rodents the Coypu *Myocastor coypus* is dominant (naturally so). An introduced fish, the carp *Cyprinus carpio* has successfully colonised all of the flooded area and is very abundant. All of these significantly effect the ecological balance of the area: the birds through consuming vegetation; the rodent through preferring roots; and the carp for turning over the bed substrate for organic material.

15. Land tenure/ownership of:

The flooded areas are state owned but many parts are still reclaimed by their owners who lost them through the earthquake. The majority of plots and islands (more than 90%) are private. Currently a social study is being made of the whole area; there is a cadastral plan [i.e. one that shows the extent, value and ownership of land for taxation purposes] with all the pieces of land and their respective roles.

16. Conservation measures taken:

Most of the wetland has been protected as a Nature and Scientific Research Sanctuary, since 1981 by Decree No. 2734 of the Ministry of Education. With it, the Ramsar convention could be approved (by Decree of Law No. 3485) and proceed with its adherence. The protected area currently covers 4,877 ha. Since 1982 the area is protected by 1, 2 and now 3 permanent wildlife wardens which have been key to protecting the area, counting waterbirds monthly from boats and marking nests occupied by black necked swans. The Universidad Austral de Chile and CONAF have participated in various research projects, in collaboration. There is still no management plan drawn up.

17. Conservation measures proposed but not yet implemented:

The incorporation of the area into SNASPE (National System of State Protected Areas) in the National Reserve category, in the name of THULAHUE, is currently being organised with CONAF and helped by the Valdivia Social Promotion [i.e. progress] Corporation, for which the area is being incorporated . The boundaries have been increased to include a total of 5,109,430 ha, including slow tributary rivers, a variety of marshland environments and bringing about more effective supervision of the area in the face of growing tourism/scientific interest and use of the area for livestock herding. in some parts. All these management activities are being carried out with financial support from the Wetland Fund.

It is hoped that a management plan will be established in the future, through a thesis [=undergraduate university student project]. Future research might include study of tides, sedimentation, limnology and management of ecological succession.

18. Current land use/ principal human activities in:

The human activities in the area are essentially use of the riverway for transport, for tourism in some areas. This is still not intensive and it is hoped that the establishment of completely land-based routes will get round the need for this type of travel on the water. It is anticipated that the future logging of the introduced coniferous forests could use the river to transport the cut logs to the city of Valdivia or to the neighbouring Puerto de Corral.

Some areas liable to flooding in the extreme north of the sanctuary are used for non-intensive livestock herding in summer and autumn, when the water level reaches its minimum. Islands in the area are still private property, the largest of them, Rialejo Island, has exotic land animals kept on it.

Irrigation is still not practised, but the discharge of waste certainly occurs, though there are not yet any data on this. In some parts trapping of the coypu *Myocator coypus* had occurred, especially near the settlement of Punucapa. The contribution of fertilizers and quantity of sediments entering the hydrographic system as a result of agriculture is unknown.

19. Disturbances/threats, including changes in land use and major development projects:

The intense forestry of exotic conifers (*Pinus radiata*) is worrying, which once ready for logging, will need routes of transport out of the area, with basin erosion and resultant rise in water load [carried eroded matter], and above all meaning the installation of extraction works and activity of personnel and machinery.

Several plants have been introduced, most of these being exotics but notable for the vegetation cover they provide: *Egeria densa*, *Elodea canadensis* in the water body, plus the majority of marshland species, with the exception of *Juncus procerus*. A series of fish have been introduced. The carp amount to a plague, and no less important is the presence of the ferocious trout. In one of the extreme southern parts of the protected area, a good hotel is being constructed which will have marina and jetty facilities.

20. Hydrological and physical values:

The río Cruces and its tributaries are freshwater. The tributaries such as the Nanihue, Cudico, Pichoy, Cayumapu and San Ramón are noteworthy, and have been incorporated in the plans for revision of the Ramsar site boundaries.

The river receives sediments from agriculture and erosive activities, which have not been measured. The aquatic ecosystem must retain much of these sediments and in this way maintain the quality and clarity of the water. It is now increasingly important for biodiversity and maintenance of food chains of the herbivore and carnivore consumers.

21. Social and cultural values:

The area features livestock farming, small vessel river transport, significant growth in tourism and scientific investigation of flora, fauna and limnology. The San Luís de Alba, a small hispanic fortress during the times of the conquest, had been reconstructed in the area.

22. Noteworthy fauna:

A list of up to 97 bird species depending directly or indirectly on this wetland has been drawn up. 46 species are residents and 9 are visitors. Of these species, *Coscoroba coscoroba* & *Plegadis chihi* are endangered, *Cygnus melanocoryphus* & *Pandion haliaetus* are vulnerable and *Ardea cocoi* is rare. The wetlands has more than 1% of the national population of the 3 species of the genus *Fulica* and the black necked swan. Also abundant are *Podiceps rolland* and *Phalacrocorax olivaceus*.

The most noteworthy mammals are the coypu *Myocastor coypus* and the endangered otter *Lutra provocax*.

There are 11 native fish species, and a further 6 introduced fish species, amongst which carp and trout stand out for their abundance.

23. Noteworthy flora:

The flora of the sanctuary is composed of more than 80 plant species. Although 65% of these are native, the introduced 32.5% of the species have the greatest biomass, which demonstrates the human influence on the area. Amongst the submerged species *Egeria densa* dominates, whilst *Scirpus californicus* does so amongst the marshland species. The most representative species are hemicryptophytes, with species of the genera *Hydrocotyle*, *Ranunculus*, *Polygonum*, *Senecio*, *Alisma*, *Eocharis* & *Juncus*.

24. Current scientific research and facilities:

The Universidad Austral de Chile has carried out all the research on birds, aquatic flora and a limnological study. Studies are currently underway of aquatic vegetation and birds such as the black necked swan and Chilean coots (an undergraduate student thesis). The Universidad Austral lies practically on the edge of the extreme south of the protected area. The future construction of laboratories, and viewpoints for scientific activity and tourism is envisaged.

25. Current conservation education:

This will be implemented in the future. Currently there are only sporadic visits by ship to the area, with tours of the countryside, the flora and fauna, and the reconstructed San Luis de Alba castle.

26. Current recreation and tourism:

Tourism is limited and of a particular type (as indicated in 25)

27. Management authority:

The Institute of Zoology, Universidad Austral (Southern University) of Chile, is responsible for all the "antecedents" [?work done which initiated the setting up of the sanctuary?] and scientific activity, and CONAF (Valdavia province section) provides wildlife wardens and local signposting.

28. Jurisdiction:

This currently lies with the representative of the National Monuments Council, which does not have any effective participation [in the sanctuary].

29. References: see original

30. Reasons for inclusion: 1a, 2a & 3a.