

5.3 Transition of the Target Wetlands

(1) Transition of wetlands during 300 years

Shrinkage of wetland areas in the eastern side of Mirim Lake during 300 years is shown in 'Basic Environmental Plan of Santa Vitoria do Palmar' in 1997 (**Figs 5.3-1 and 5.3-2**). In the above report, restoration of the past situation was made by analysis of seeds in the ground, soil types, hydrology and topography of the area. It is evident that expansion of rice field was the main cause of wetland loss. Starting from technically and economically easy areas, drainage must have advanced by draining and constructing dikes. Del Rei wetland system that is the largest and natural preserved wetland is not an exception. Remaining area of Del Rei is mostly permanent waters that is difficult to drain, and the loss is most severe at seasonally water-logged marshy areas. Decisive disappearance is the native forests called 'Restinga' that were attached to the wetland areas. Although such areas were small even 300 years before, today they no more remain in the eastern side of Mirim Lake. Native palm trees that barely remain in farmlands are in the same situation, and absence of young trees indicates termination of generation changes.

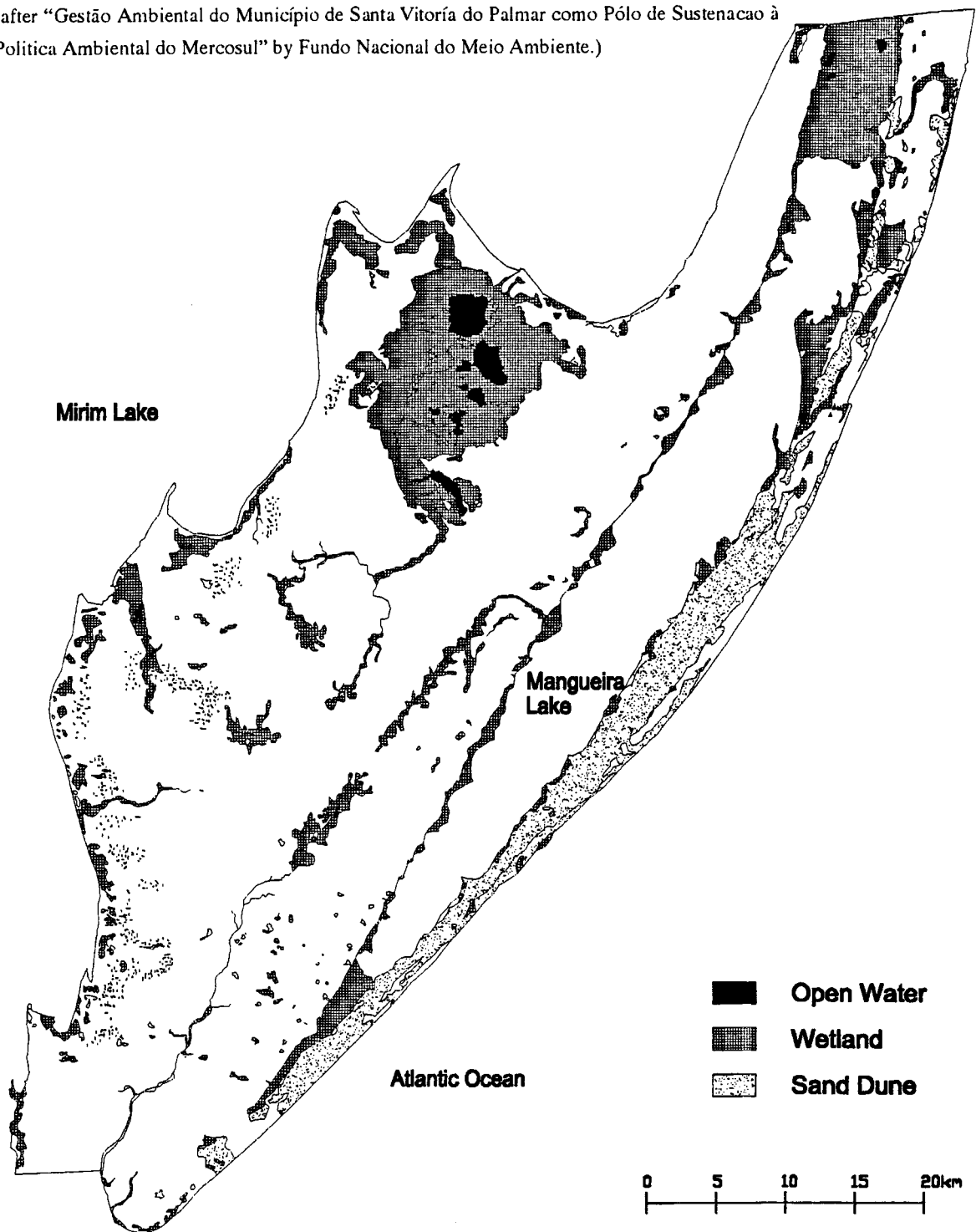
(2) Transition of wetlands during 30 years

Based on aerial photos of 1964-1965 and LANDSAT imageries of 1998, changes of wetlands were compared at Camaqua riparian forest, Lagoa Pequena (**Figs 5.3-3 and 5.3-4**) and Del Rei Wetland (**Figs 5.3-5 and 5.3-6**). At Camaqua riparian forest, shrinkage of forests was not noticeable except for the area upstream of BR-116 bridge. At Lagoa Pequena mouth, shrinkage of wetland area was not apparent, too. At Del Rei Wetland, open water areas were mostly intact except for the disappearance of a pond. It is not clear whether the latter disappearance is seasonal or permanent because those ponds are shallow and used for irrigation. There were noticeable changes in the image of marshy areas that are ecologically important as land-water ecotone. It is difficult, however, to confirm the change because the condition of marshy area changes seasonally and is susceptible to hydrological conditions. In the lowland study area, almost all the areas that has agricultural potential economically are already utilized, and there remain little undeveloped areas. Del Rei Wetland is not an exception, but encroachment of farmland to marshland was noticeable in some part.

Climatic change seems not a cause of wetland shrinkage because precipitation in the

study area during latest 10 years does not indicate decreasing tendency. Judging from these facts, wetland degradation in the study area is not an acute one but a chronic process that gradually took place for centuries together with agricultural development. In general, wetlands in Patos Lake basin were pool-type that has less marshy surrounding area and connected directly to agricultural area. On the other hand, those in Mirim Lake basin had more marshy areas. This is because the economic development of the former basin preceded to the latter.

(after "Gestão Ambiental do Município de Santa Vitória do Palmar como Pólo de Sustenacao à Política Ambiental do Mercosul" by Fundo Nacional do Meio Ambiente.)



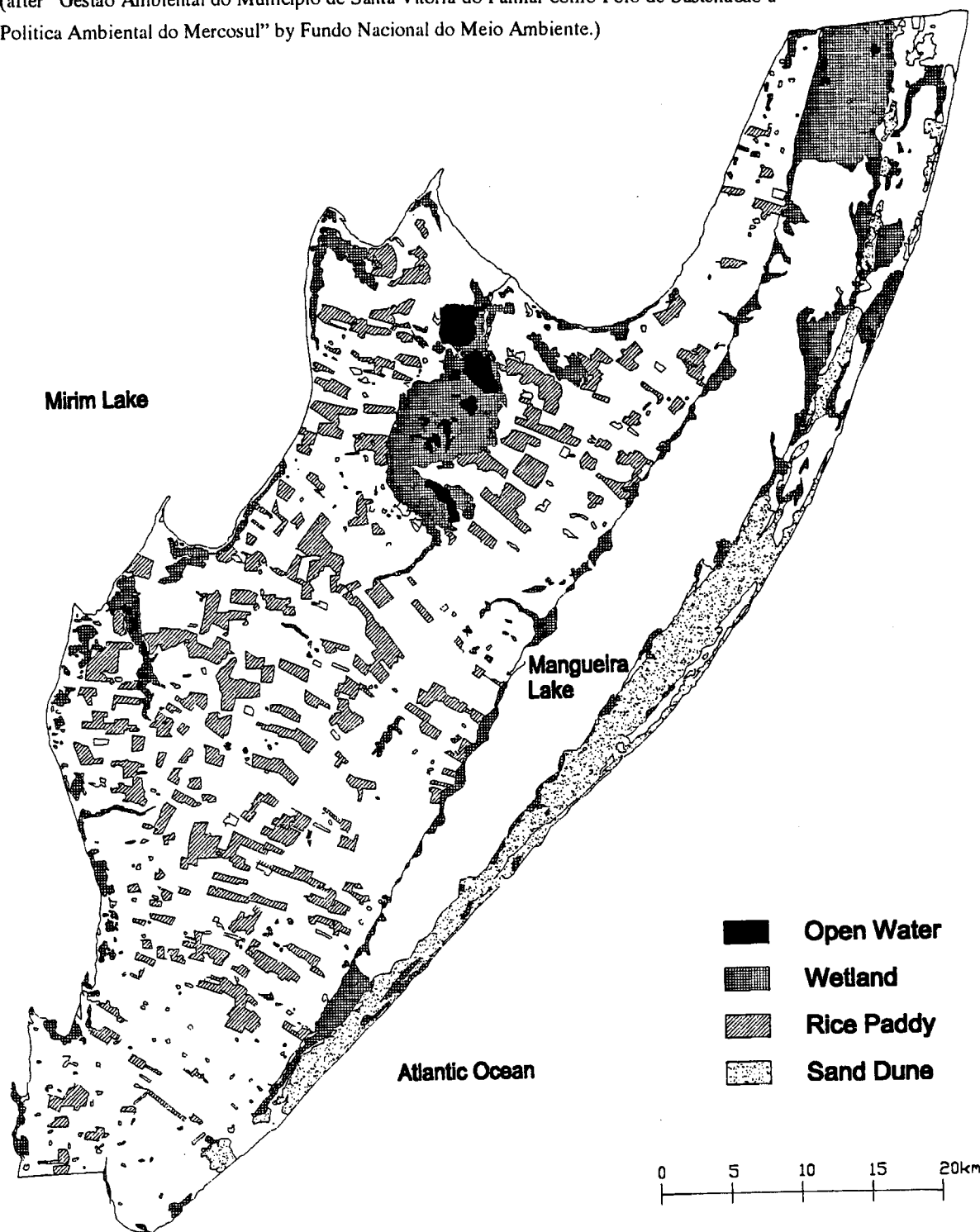
THE STUDY ON THE ENVIRONMENTAL MANAGEMENT
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Fig. 5.3-1

**Wetland Status at 300
Years ago in
Santa Vitoria do Palmar**

(after "Gestão Ambiental do Município de Santa Vitória do Palmar como Pólo de Sustenacao à Política Ambiental do Mercosul" by Fundo Nacional do Meio Ambiente.)



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Fig. 5.3-2

**Wetland Status
at Present (1995-1996)
in Santa Vitoria
do Palmar**



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Fig. 5.3-3

**Aerial Photo of
Lagoa Pequena mouth
on 10th Jan 1965
(Scale: 1:60,000)**



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Fig. 5.3-4

**LANDSAT Imagery of
Lagoa Pequena mouth
in 1998
(Scale: 1:60,000)**

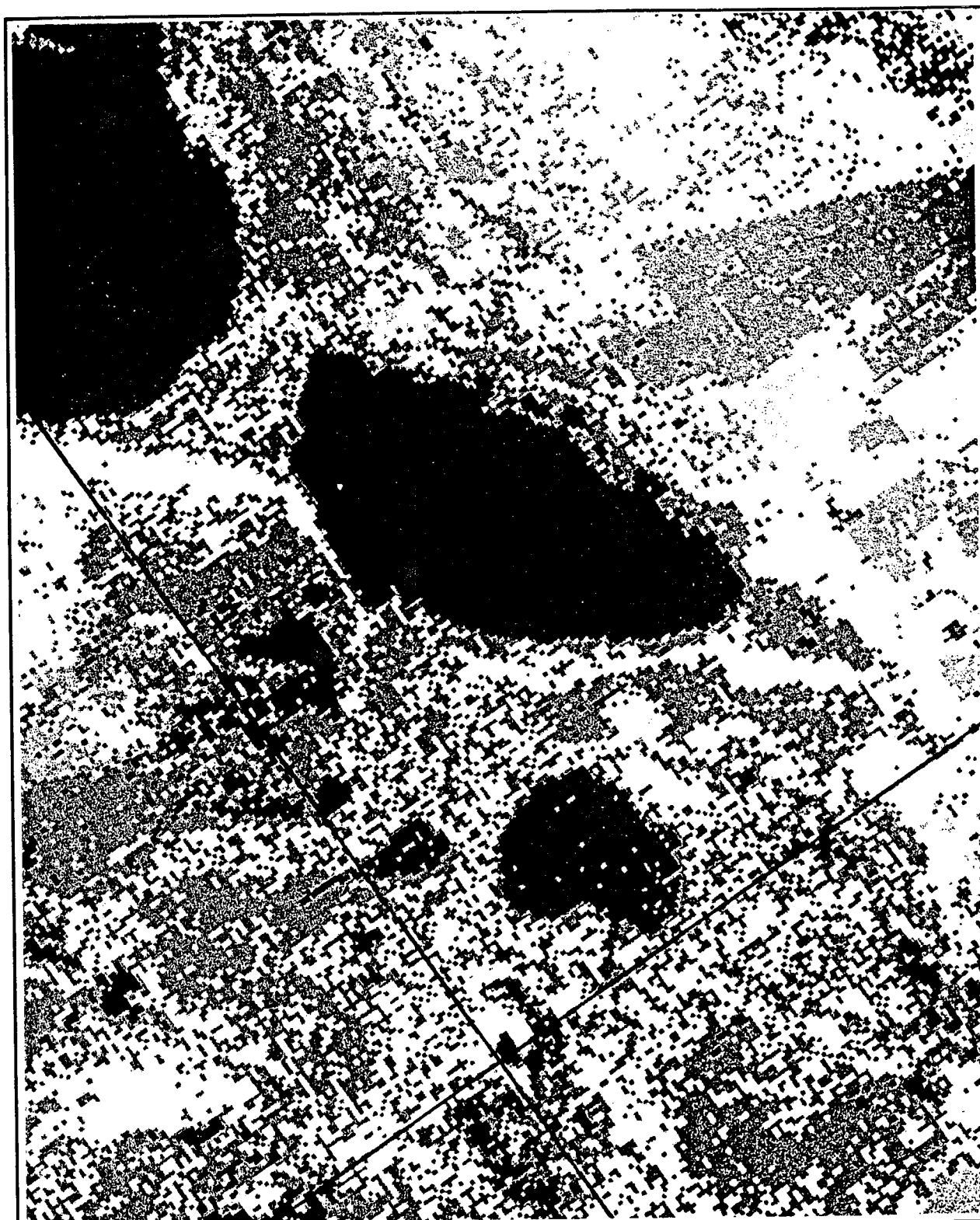


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Fig. 5.3-5

**Aerial Photo of
Del Rei Wetland
on 10th Dec 1964
(Scale: 1:60,000)**



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Fig. 5.3-6

**LANDSAT Imagery of
Del Rei Wetland
in 1998
(Scale: 1:60,000)**

5.4 Evaluation of the Wetlands

(1) Ecological value

Existing ecological values of selected wetlands are shown in **Table 5.4-1**. Potential value is shown only on that of wildlife corridor. Camaqua (area No.2), L. Pequena (9), Estuarine Patos (26), Del Rei (29), Taim (36), Canal. de Sao Goncalo (43) are highly rated in terms of both faunal and floral values. Estuarine Patos had high rating though it is highly populated and intensively used. Lagoa do Peixe (21) has very high importance for migratory birds. Rice paddy near BR-471 (31) was highly rated because it is an important habitat of native emu. In general, small wetlands surrounded by rice paddy and pastures were in poor conditions. Since aims of Mata Atlantica Biosphere Reserve Program include securing corridors, values as wildlife corridor was evaluated based on the zoning of the program.

(2) Social and economic value

Social and economic value of selected wetlands is shown in **Table 5.4-2**. Most wetlands are used as agricultural and grazing sites. Open waters of most wetlands in agricultural areas are used for irrigation, and 'wise use' of wetlands for agriculture is almost identical with sustainable water level management. Brackish area of Patos Lake had special importance for fishery. Forestry mainly occurs at coastal areas where soil conditions are not suitable for agriculture. This industry had little relevance with wetlands except for impacts on natural flora. Tourism, outdoor recreation and educational use are still not large enough to affect on wetland ecology. Although some wetlands like Del Rei is used for hunting, it is a declining recreation and the impact seems not serious. Scientific research is active only at limited places. Aquatic study is mainly made at estuarine Patos, and bird study mainly at coastal wetlands. Extraction of natural products is not applicable in this area, though the feasibility of peat mining is locally sought.

(3) Implication with the Ramsar Convention

Presently there are five registered Ramsar sites in Brazil (**Fig. 5.1-2**) and L. Peixe (21) is the only coastal wetland in the temperate zone. In view of the eight criteria for

Internationally Important Wetland that are mentioned in the Resolution 7.11 of the Convention (**Table 5.4-3**), L. Peixe(21), Taim(29) and Del Rei(36) clearly satisfy criteria 5 and 6 on the number of waterbirds. Some other wetlands seem satisfying criteria 1, 2, 3 and 8, but further investigation on the applicability is necessary because numerical guidelines are not indicated in other criteria.

Table 5.4-1 Ecological Values of Selected Wetlands

No.	Wetland Areas	Flora			Fauna					
		Biogeographically important species/communities,	Rare or endangered species/communities	Good examples of native plant communities	Unique or biogeographically important species	Rare or endangered species	Species in inter-nationally significant numbers	Nursery / spawning place of aquatic organisms	Habitat for fish	Wildlife corridor #1
1	Rio Camaquã riverside	○								
2	Parque Estadual do Camaquã	○	○	○	○	○		○	○	○
3	Agricultural reservoirs near Arambaré									
4	Wetland system near Lagoa do Cerro									△
5	Lagoa Formosa (near Tapes)									△
6	Arroio Velhaco									△
7	Banhado do Caipira									○
8	Arroio Grande in L30-6									
9	Lagoa Pequena	○	○	○				○	○	○
10	Parque Estadual de Itapuã	○		○		○				○
11	Lagoa dos Barros									
12	Lagoa Capivary									△
13	Lagoa dos Gateados									△
14	Banhado Grande in L20									△
15	Banhado das Casimbas									△
16	Lagoa da Reserva									△
17	Lagoa do Rincão									△
18	Lagoa do Sumidouro									
19	Banhado Claudinho									△
20	Coastal lakes north of Peixe Nat. Park									△
21	Lagoa do Peixe National Park				○	○	○		○	○
22	Coast between Peixe N.P. / Rio Grande	○					○		○	○
23	Lagoa da Turnera									△
24	Lagoa dos Patos eastern (L20) side									△
25	L. Patos western (L30-5,L30-6) side								○	△
26	L. Patos estuarine (L40-2) part	○	○	○	○	○		○	⊗	○
27	Ilha da Torotama	○								△
28	Saco do Mangueira								○	
Mirim Lake Basin										
No.	Wetland Areas	Flora			Fauna					
		Biogeographically important species/communities,	Rare or endangered species / communities	Good examples of native plant communities	Unique or biogeographically important species	Rare or endangered species	Species in inter-nationally significant numbers	Nursery / spawning place of aquatic organisms	Habitat for fish	Wildlife corridor
29	Del Rei wetland system			○	○	○	○		○	○
30	Banhado dos Afogados									△
31	Rice paddy I near BR-471				○	○	○			○
32	Banhado de São Miguel									○
33	Barra Falsa wetland system									○
34	Lagoa Mangueira								○	○
35	Banhados between Taim and Quinta			○						○
36	Estação Ecológica do Taim			○	○	○	○		○	○
37	Arroio Pastoreio									
38	Coast between Rio Grande and Chui					○	○		○	○
39	Arroio Juncal									
40	Rio Jaguarao								○	△
41	Banhado Mundo Novo			○						○
42	Banhado Mato Grande			○						○
43	Canal de São Gonçalo and L. Formosa			○			○	○	○	○
44	Rio Piratini			○				○	○	○
45	Arroio Pelotas									△
46	Lagoa Mirim western (L40-5) side			○					○	○
47	L. Mirim north-eastern (L40-1) side								○	○
48	L. Mirim south-eastern (L40-1) side								○	○

Note: ○, present value; △potential value; Importance of wildlife corridor is based on zoning of Mata Atlantica Biosphere Reserve.

Table 5.4-2 Social and Economic Values of Selected Wetlands

[illegible]

Note: A, agricultural; Present use include illegal ones.

Table 5.4-3 Relevance of Selected Wetlands with Criteria for Ramsar Registration

Criteria Group	Criteria and examples of relevant attributes	Apparent and possible applicability
A: Sites containing representative, rare or unique wetland types	Criterion 1: It contains a representative/rare/unique example of a natural or near-natural wetland type within the appropriate biogeographic region.	2, 29, 35
	70-i. natural control, amelioration or prevention of flooding	
	70-ii. seasonal water retention for wetlands or other areas of conservation importance downstream.	
	70-iii. recharge of aquifers.	
	70-iv. form part of karsts or underground hydrological or spring systems that supply major surface wetlands.	
	70-v. major natural floodplain systems.	
	70-vi. hydrological influence on regional climate regulation or stability.	
	70-vii. maintaining high water quality standards.	
B: Sites of international importance for conserving biological diversity	Criterion 2: It supports vulnerable, endangered, or critically endangered species or threatened ecological communities.	2, 9, 21, 26, 29, 31, 33, 36, 37
	74-i. support a mobile population of a species at different stages of its life cycle.	
	74-ii. support a population of a species along a migratory pathway or flyway.	21, 29, 36
	74-iii. providing refuge areas to populations.	21, 29, 36
	74-iv. adjacent to other wetlands included in the Ramsar List.	29* ¹ , 31* ¹ , 32* ²
	74-v. hold a high proportion of the population of a dispersed sedentary species that occupies a restricted habitat type.	
	75-i. include significant areas having certain communities, particularly where these are of high quality or particularly typical of the biogeographic region.	
	75-ii. are sites which have rare communities.	
	75-iii. include ecotones and communities which exemplify particular processes.	
	75-iv. have communities that can no longer develop under contemporary	37
	75-v. have communities of a long developmental history.	
	75-vi. have communities that are functionally critical to the survival of other perhaps rarer communities or particular species.	
	75-vii. contain communities which have been the subject of significant decline in extent or occurrence.	
	Criterion 3: It supports populations of plant/animal species important for maintaining the biological diversity of a particular biogeographic region.	2, 9, 43, 44, 21, 29, 36
	78-i. are "hotspots" of biological diversity and are evidently species-rich.	
	78-ii. are centres of endemism or otherwise contain significant numbers of endemic species.	
	78-iii. contain the range of biological diversity including habitat types occurring in a region.	
	78-iv. contain a significant proportion of species adapted to special environmental conditions.	
	78-v. support particular elements of biological diversity that are rare or particularly characteristic of the biogeographic region.	
	Criterion 4: It supports plant/animal species at a critical stage in their life cycles, or provides refuge.	
	Criterion 5: It regularly supports 20,000 or more waterbirds.	21, 29, 36
	Criterion 6: It regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.	21, 29, 36
	Criterion 7: It supports a significant proportion of indigenous fish subspecies, species or families.	
	Criterion 8: It is an important source of food for fishes, spawning ground, nursery and/or migration path.	2, 26, 43

Note: *1, Taim Ecological Station is substantially managed as a Ramsar site by IBAMA although it is not officially registered.

*2, Connected to Ramsar site (d'Leste Wetland) in Uruguay.