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THE WETLANDS – CATEGORIES, FUNCTIONS, ECOLOGICAL RECONSTRUCTION AND MANAGEMENT WITH SPECIAL REFERENCE TO ROMANIA

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ABSTRACT

A wetland is a territory saturated with water long enough to promote wetland or aquatic processes as indicated by poorly drained soils, hydrophytic vegetation, and various kinds of biological activity which is adapted to a wet environment. From this classical definition, the current range of wetlands has been widened very much, including beside natural zones (lakes, streams, marine coastal waters) also man-made ones (reservoirs, canals, irrigated grounds, etc.). The impact of human activity to recover agricultural terrain has led to the shrinking of wetlands, particularly in the floodplains and in the low overmoist areas outside the river valleys. The negative effects of such action on biodiversity, local climate, etc., called for a different approach to the role played by wetlands, that has materialised in a number of ongoing ecological reconstruction projects (eg. the Danube Green Corridor, the Danube Delta, etc.).

Keywords: wetlands, definition, clasification, ecological reconstruction.

1 INTRODUCTION

Wetlands, or excess humidity areas, are climate-dependent and closely related to the precipitation-**X**/evapotranspiration-**Z** ratio**(X/Z).** Whenever the quantity of precipitation overcomes the water evaporation capacity of a given perimetre, the conditions are ripe for the development of moist grounds or wetlands.

With the exception of some bodies of water - seas and oceans (the Planetary Ocean), such a situation is found in three major cases:

- in the equatorial, humid tropical and sub-polar zones where precipitation exceeds the evaporation/transpiration capacity;
- in the medium-sized and high mountain zones, in terms of latitude;
- alongside the hydrographic avenues where excess humidity is the result of the hydraulic relations between catchments, floodplains and the corresponding deltas.

The first two cases are supposed to have a zonal character, the last one is azonal.

A brief historical overview reveals that in the Antiquity wetlands in general and marshlands, in particular were inaccessible. But, in time, the wealth of their renewable resources (plants and animals) made autochthonous populations develop the necessary skills to put these areas to account.

The rivers and their floodplains proved to be vital thoroughfares and at the same time the cradle of some ancient civilisations (e.g. of the Nile, the Tigre, the Indus and the Ganges). Today, they concentrate huge populations and numerous settlements.

However, apart from playing a positive role in the life of human society, wetlands are also foci of disease, of catastrophic floods, etc. These negative effects and the need to reclaim terrains for agriculture led to the construction of embankments and to the draining of many such areas. These actions have in time triggered detrimental secondary processes (salted lands, aridisation and a depleted biodiversity), and regional ecological imbalances.

In the latter half of the 20th century, the necessity to obtain more land for agriculture and create defences against flooding made people build reservoirs, sometimes strings of reservoirs. So, in total disregard of environmental protection, such structures were erected in many places of the world (e.g. on the Tennesse, the Volga, the Don, the Dneper, and in Romania on the Olt and the Argeş) and the negative consequences are becoming only too obvious now.

2 THE WETLANDS – DEFINITION AND CLASSIFICATION

Article 1 of the Ramsar Convention defines the wetlands as those areas of lakes, swamps and peat bogs, being natural sites or man-made, permanent or temporary, with fresh, brackish or salted water, and also includes in this category the areas covered by marine waters of less than 6 m depth .

According to this definition, and despite the multitude of variants, wetlands, which cover a much wider sphere, can be classified as follows (tab.1):

- marine and coastal (shallow waters, tide-governed aquatic surfaces, coral reefs, rocky shores, sandy beaches, marine estuaries, tide-affected forests, salmastrian and salty lagoons and swamps);
- inland waters (rivers and canals with permanent discharge, rivers and canals with intermittent and temporary discharge, lakes, temporary fresh-water lakes, marshy bushes, fresh water boggy forests, peat-bogs, tundra and Alpine wetlands, fresh-water springs, geothermal zones);
- anthropic wetlands (big reservoirs, ponds, small water-basins, fish-farm basins, salt-rich zones, water-filled excavations, water purificarion stations, irrigated terrains, rice plantations, seasonally flooded arable lands).

Table 1. Classification system for wetland type

Marine and coastal wetlands	
Shalow marine waters	Intertidal mudflats
Subtidal aquatic beds	Salt marshes
Coral reefs	Mangrove/tidal forests
Rocky marine shores	Brackish/saline lagoons
Sand/shingle beaches	Freshwater lagoons/marshes
Estuarine waters	
Inland waters	
Permanent rivers/streams	Seasonal freshwater ponds/marshes
Seasonal/irregular rivers streams	Shrub swamps
Inland deltas	Freshwater swamp forest
Riverine floodplains	Peatlands
Permanent freshwater lakes	Forested peatlands
Seasonal freshwater lakes	Alpine/tundra wetlands
Saline lakes/marshes	Freshwater springs
Freshwater ponds/marshes	Geothermal wetlands
Artificial wetlands	
Water storage areas	Excavations
Farm ponds, small tanks	Wastewater treatment
Aquaculture ponds	Irrigated land, rice fields
Salt pans, salinas	Seasonally flooded arable land

3 SOME MAJOR WETLAND FUNCTIONS

A habitat of high genetic and biodiversity potential as a result of the relationship between the aquatic and the terrestrial environments which is particularly obvious in the river floodplains;

- An outlet for floods, a place of fish reproduction during the high waters;
- A filtre of excess nutrients and pollutants carried by the river itself and supplied by the riverine terrains. Studies have shown that wetlands can retain about 100 kg total nitrogen and 10-20 kg total phosphorus/ha/year. At the same time, the physico-chemical and hydrological processes deplete the quantity of suspension particles, colloids and heavy metals. According to estimates, these areas can retain daily 40 kg/ha of Fe, Zn, Pb and 1 kg/ha of Cu, Cd, Cr and Ni, also depleting the quantities of organic micropollutants and coligerms;
- The habitat of water-fowl, irrespective of flooded area alongside the rivers, natural and anthropic lakes, deltas, marine and coastal waters
- The air humidity produced by evapotranspiration attenuates the continental climate thus creating a milder microclimate and topoclimate;

- The biological biodiversity and productivity builds vast areas of plant and animal resources which are put to account at local and regional level.

4 WETLANDS IN RONANIA

According to the above classification, 80% of the previously mentioned wetlands are found in Romania's territory where they have different expansions.

After Romania had signed the Ramsar Convention in 1991, and an Environmental Protection Strategy was elaborated by the Ministry of Waters, Forests and Environmental Protection (as it was officialy named in 1996) the next step (1997) was to implement a programme of monitoring the wetlands. The programme coordinator was The Danube Delta National Research-Design Institute, together with other institutions among which the Institute of Geography.

On the basis of available studies and publications, several wetland sites/zones were synthetised as follows: 200 oligothrophic swamps (18 km²); 200 euthrophic swamps (52 km²); 3,450 natural and anthropic lakes (cca. 4,600 km²); 115,000 km of permanent and temporary river flows, 400 km² representing the marine coastal waters down to 6 m deep. In order to create a national data-bank and make proposal for inclusion on the Ramsar list of wetlands of international importance, a number of 153 wetland sites/zones were selected and studied by a standard methodology. In the Ramsar List for the year 2000, which comprises about 1,000 wetlands, Romania is present only with the Danube Delta (Török, 2002)

The number of wetlands in Romania decreased considerably over the 1960-1990 period, especially the river floodplains which were embanked and drained. With a few exceptions (Balta Mică a Brăilei), this happened also to the Danube Floodplain downstream of Calafat and as far as Isaccea. The modules created in the Danube Delta, whether for agriculture, forestry or fish-farming, have eliminated about 1,000 km2 from the natural water regime. The floodplains of the Prut, the Siret, the Ialomiţa, the Argeş, the Olt, the Jiu, the Timiş, and the Bega, the Mureş, the Three Criş Rivers, and the Someş, suffered numerous changes either through the construction of storage-lakes and feeders that left catchments dry and led to the extinction of river ecosystems, or through embankments and drainings.

Hydrotechnical works such as the cutting of meandres (e.g. the Sfântu Gheorghe Arm in the Danube Delta), the consolidation of river banks and even the concreting of the channel-beds (e.g. the Dâmboviţa River which crosses the city of Bucharest) have modified flow rates, destroyed the river-bank vegetation and the specific ecosystems (fig.1).

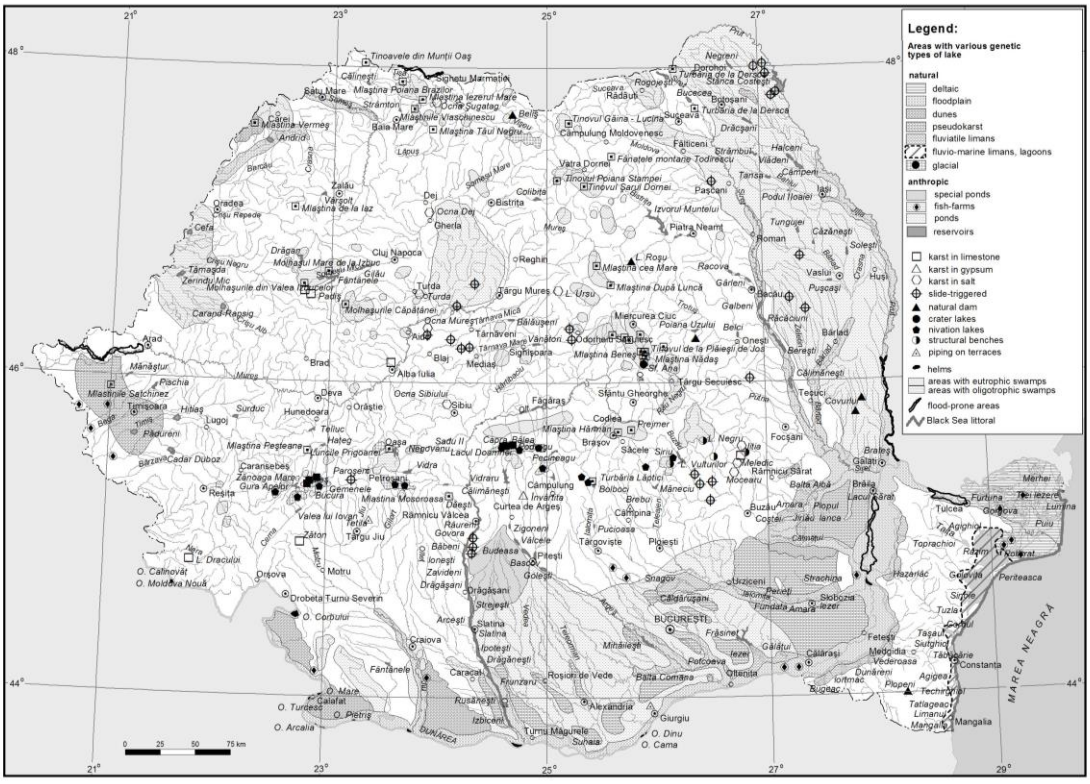

Figure 1. The wetlnd type in Romania

5 THE RECONSTRUCTION AND MANAGEMENT OF WETLANDS

The importance of wetlands stated in the 1971 Ramsar Convention as habitat of water-fowl was subsequently acknowledged by everybody.

In 1995, the European Commission, recognising the value of wetlands, elaborated the Framework Convention 2000/60/EC aimed in principal at improving the state of the aquatic and of the riverine terrestrial ecosystems.

Since many wetlands have been drained, several projects are underway in various parts of the Globe to promote ecological reconstuction.

In Romania, such projects target the Danube Delta Biosphere Reserve (the Babina and Cernovca isles, the abandoned fish-farms of Popina and Holbina-Dunavăţ) and the Danube Green Corridor.

The Danube Green Coridor Project, which was discussed at a meeting of the environment ministres from the Lower Danube Riverine Countries (Romania, Bulgaria, Ukraine and the Republic of Moldova), Bucharest, May, 2001, is being coordinated by the Danube Delta National Research-Design Institute in collaboration with profile institutions and NGOs and in cooperation with the World Wildlife Fund (WWF). The purpose of this project is to single out several areas (totalling cca 2,000 km²) important on the routes of migratory birds and fish-spowning sites, as genetic stock reservoirs; other sites (totalling cca 1,000 km²) are scheduled for ecological reconstruction.

Another project begun in 2002 and which targets the Mureş drainage basin, was elaborated by ARCADIS – The Netherlands, the Mureş Waters Direction and the Romanian Waters Administration in collaboration with ICIM – Bucharest (National Institute for Environmental Research and Engineering) and RIZA – the Netherlands. This pilot-project has in view the structure of the permanent and temporary wetland zones, and the network of protected areas under the Directive 2000/60/EC and is intended to become a model for other drainage basins, too.

The management of wetland zones needs to be a long-term issue in order to combine conservation with protection.

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