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The Dnestr Delta, Black Sea: ornithological importance, conservation problems and management proposals

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Abstract — The Dnestr Delta is one of the most intact wetland ecosystems in the Black Sea. In a total area of 220 km², dominated by extensive reedbeds, important populations of waterbirds nest in colonies, some of them in numbers of international significance. The seasonal floods of the river are the key factor for the functioning of this wetland ecosystem, but human intervention and the construction of a hydroelectrical dam are now having serious environmental impact on the delta. A management plan for the waters of the river should be fully implemented and the delta should be designated as a National Park in order to halt and reverse its degradation.

Introduction

The Dnestr Delta is situated on the NW coast of the Black Sea, in the Ukraine (46x27'N-30x10'E), 30 km SW of Odessa city. It covers an area of 220 km² of natural habitats. The dominant vegetation consists of extensive reedbeds *Phragmites australis*, whereas along the river and on high ground there are large zones of willows *Salix cinerea* scattered among the reedbeds. Within the delta, there are 25 small and 4 larger freshwater lakes covering a total area of 8 km².

The Dnestr flows into the sea through a narrow freshwater lagoon of 408 km² and 1-1.5 m deep. The river, one of the largest in the Black Sea region, has an average water discharge of 322 m³/sec, but when in flood it can reach peaks of 500-1500 m³/sec. The river floods regularly from 3 to 11 times/year. The extent of flooding in the delta depends on the width of the floodplain, which varies between 3 km in the upper part of the delta to 13 km near the sea: the broader the floodplain the less extensive the flood is. During these floods the water in the floodplain can reach 1-2 m deep.

This regular, natural flooding is the key factor to the functioning of the whole delta ecosystem, upon which a very rich and diverse flora and fauna, particularly birds, depend.

This paper presents, in a summary form, the ornithological importance of the Dnestr Delta and its conservation problems, providing also some guidelines and proposals for its ecological management. The author draws heavily on his 18 year experience in monitoring the bird populations of the delta and has attempted to assess the impact of recent human activities on this important wetland ecosystem by using them as bio-indicators (Diamond and Filion 1987).

Results and Discussion

67 bird species have so far been recorded as breeding in the Dnestr Delta (data from 1972 to 1991) (Table 1). For some of these species, particularly from the last two categories, the Dnestr Delta hosts breeding populations of international or regional importance: so far, 11 species qualify for such criteria (Grimmett and Jonew 1989) and at least one, the Glossy Ibis *Plegadis falcinellus*, a species declining over all its Palearctic range, still nests in large numbers (200-1450 pairs) (Table 1). The delta also hosts large concentrations of migrating waterfowl and waders, but it is much less used by birds in winter, because it usually freezes over. Due to its ornithological importance, the Dnestr Delta has already been classified as an Important Bird Area (no: 054) (Grimmett and Jones 1989), though it still lacks any legal protection.

Although the Dnestr Delta still offers optimum habitats for nesting waterbirds, the seasonal floods, particularly during the breeding season, are a serious limiting factor, adversely affecting overall breeding success. The birds have, of course, developed various strategies of nest site selection in order to cope with the floods. It is however, beyond the scope of the present paper to attempt an analysis of these strategies (Schogolev in prep.). What can be very

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briefly mentioned here is that, depending on the species, nests are built on the higher parts of trees or bushes, among the drier parts of the reedbeds, on rafts of floating vegetation or simply float. Nevertheless, when the floods are intense and the water level rises more than 1.5 m, heavy losses of nests, eggs or chicks occur.

The geographical location of the colonies of Ciconiiformes and the Mute Swan *Cygnus olor* nests are shown in Figure 1.

The history of human intervention in the Dnestr Delta can be divided into three periods.

The first period starts at the beginning of the century up to 1950. In this period human impact on the delta was very slight to negligible.

The second period is from 1954-1982, when large areas of marsh (150 km^2) in the delta were drained for agriculture, particularly in Moldavia. As well as agricultural developments since 1976, fishery installations were also constructed in the delta, destroying large zones of natural habitats in an area of more than 15 km^2. Finally, at the end of the 1970s, two large roads constructed across the centre of the delta, destroyed the hydrological balance over much of the area, by blocking some of the secondary branches of the river and thus preventing the natural floods from inundating an average of 40 km^2 in the lower part of the delta. In this period, pollution problems started to appear.

In 1970-1972 the port of Belgorod-Dnestrovskii was reconstructed. Excavation works and the deepening of the freshwater lagoon destroyed its hydrological balance. Now more sea water enters the delta (particularly in dry seasons) and this has a great impact particularly on water invertebrates like crayfish etc. During the same period, a great increase in erosion problems also took place. It is estimated that many thousands of tons of soil silted up many lakes and channels. Siltation at the bottom of these lakes has reached 0.6- 1.8 m, resulting in water circulation problems in much of the delta. Finally many more people were now using the delta, resulting in overfishing, overhunting, poaching etc.

In the third period (1983-1992) the major environmental problems of the delta are related to the construction and operation of a large hydroelectric plant (700,000 kW power), nearly 700 km upstream along the river. The artificial lake of this plant now covers a surface of 150 km^2 with a water volume of 3.3 km^3. The construction and operation of this plant had a very serious impact on the delta ecosystem, particularly in 1986-1987.

This ecological crisis was due to a strong reduction in the natural discharge of the river from an average

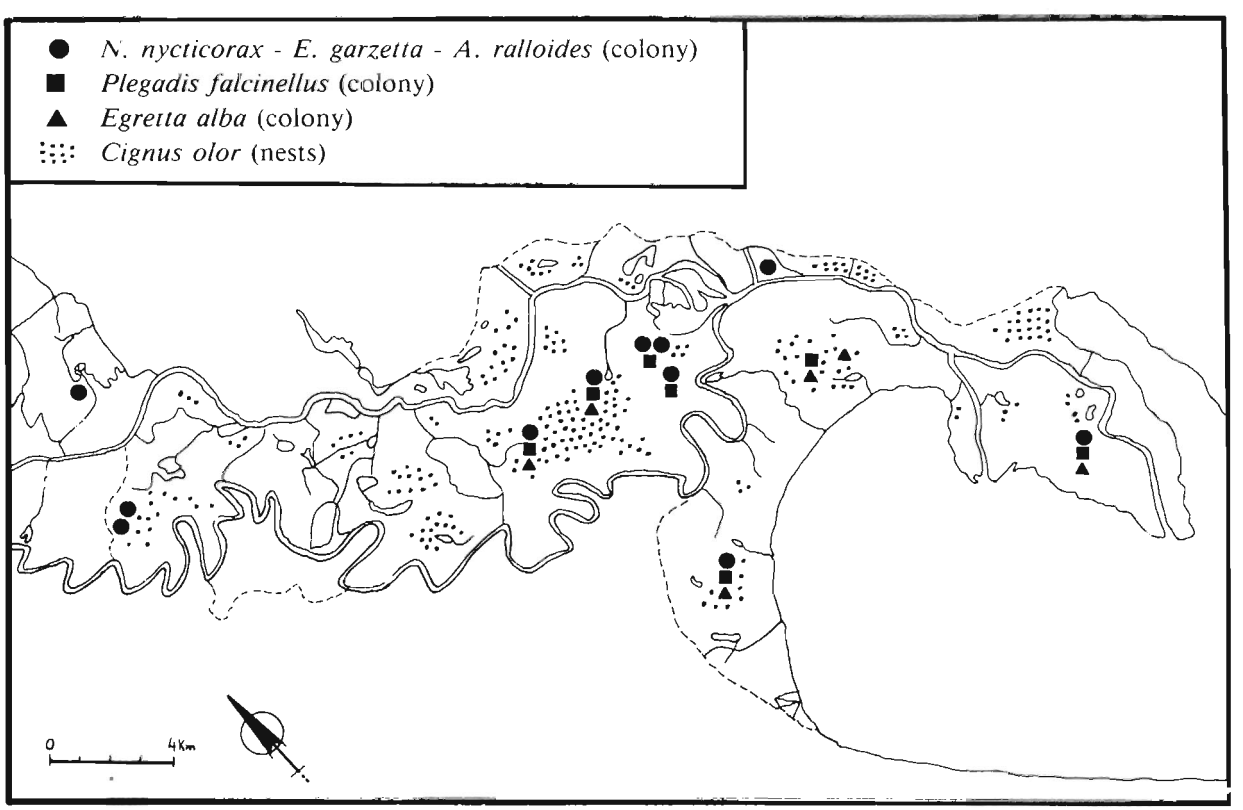

Figure 1: Dnestr Delta. Distribution of large wader colonies and Mute Swan nests.

of 300 m^3/sec to 160-200 m^3/sec. Moreover this reduced volume of discharge was now artificially controlled and kept at the same level for more than 16 months. In this 16 month period, no natural flooding occurred because of the filling up of the reservoir. As a first result of the reduced flow, phenomena of algal blooms appeared for the first time in the freshwater lakes of the delta and also in the lagoon in front of the river mouth. Then the dried up marshes started to burned by local, over an area of 50 km^2. The overall ecological disaster became much worse in the spring and summer of 1987, after 14 months of drought, when the first indicators of terrestrial vegetation appeared. Populations of fish and amphibians crashed and mass deaths of freshwater bivalves e.g *Anodonta cygnea,* insects and water insects e.g. *Emphemera velgata, Dytiscus* spp., *Cybister* spp. etc. occurred.

Inevitably, the populations of nesting waterbirds were also very adversely affected. As shown in Table 2, some species, mainly insectivorous ones e.g. Glossy Ibis, Squacco Heron, or waterfowl e.g. Mute Swan, did not nest at all in 1987 or with only very few pairs, compared with previous breeding seasons.

This critical situation gradually started to improve, particularly during the first months of 1988, when natural floods were now allowed to inundate the delta. The populations of nesting waterbirds started to recover and by 1989 the ecological balance in the delta, at least as indicated by the bird populations (Table 2), was re-established.

Conclusions and proposals for conservation

Through the ages, the Dnestr Delta has evolved to become a stabilised, but at the same time dynamic wetland ecosystem. The proper functioning of the ecosystem is totally dependent on the hydrology of the river and particularly on its seasonal floods. Despite the 16 month "artificial" drought during the 1986/87 crisis, the whole ecosystem quickly recovered when the floods started again. However with the construction of the hydroelectric plant, the waters of the Dnestr are now controlled by man and the ecological crisis of 1986/1987 proved that man has very little respect for the delta ecosystem, and is interested only in energy production. It was only after strong protests and pressure from local conservationists that the electricity company authorities were persuaded to manage the river in such a way that more water was allowed to flood the delta. This water management programme started in 1988 and it was due to this programme that the delta regained most of its former importance. During the year, two "artificial" ecological floods (in spring and summer) are released, carrying about 1.5 km^3 of

Table 1. Number of breeding pairs in the Dnestr Delta (1979-1991). FB denotes former breeding species.

Species	No. of breeding pairs	
Podiceps cristatus	80-150	
Podiceps grisegena	40-100	
Podiceps nigricollis	3-22	
Phalacrocorax carbo	100-2300	
Phalacrocorax pygmaeus	2-30	
Botaurus stellaris	3-6	
Ixobrychus minutus	20-30	
Nycticorax nycticorax	1500-2500	
Ardeola ralloides	400-600	
Egretta garzetta	200-400	
Egretta alba	250-350	
Ardea cinerea	100-200	
Ardea purpurea	100-150	
Ciconia ciconia	15-20	
Plegadis falcinellus	200-1450	
Platalea leucorodia	4-12	
Cygnus olor	10-320	
Anser anser	100-140	
Anas platyrhynchos	60-90	
Anas querquedula	2-6	
Aythya ferina	5-10	
Aythya nyroca	2-4	
Milvus migrans	3-10	
Haliaeetus albicilla	0-1	(FB)
Circus aeruginosus	3-5	
Buteo buteo	1	
Falco tinnunculus	1	
Falco subbuteo	2-4	
Falco cherrug	0-1	(FB)
Rallus aquaticus	15-25	
Gallinula chloropus	80-150	
Fulica atra	250-450	
Himantopus himantopus	1	
Vanellus vanellus	1-3	
Larus ridibundus	40-250	
Sterna hirundo	300-600	
Chlidonias hybridus	160-460	
Chlidonias niger	4-15	
Columba palumbus	3-8	
Streptopelia turtur	3-6	
Cuculus canorus	8-15	
Bubo bubo	0-1	(FB)
Asio otus	5-20	
Alcedo atthis	5-8	
Riparia riparia	30	
Hirundo rustica	15-30	
Motacilla alba	2-4	
Luscinia luscinia	3-8	
Phoenicurus phoenicurus	2-3	
Locustella luscinioides	100-150	
Acrocephalus schoenobaenus	90-120	
Acrocephalus agricola	80-120	
Acrocephalus scirpaceus	250-350	
Acrocephalus arundinaceus	80-150	
Sylvia borin	6-10	
Panurus biarmicus	150-300	
Parus caeruleus	10-20	
Remiz pendulinus	5-15	
Oriolus oriolus	1	
Pica pica	6-10	
Corvus frugilegus	30	
Corvus corone	400-500	
Corvus corax	1	
Sturnus vulgaris	15-20	
Passer montanus	15	
Fringilla coelebs	5-10	

Table 2. Impact of the hydroelectric plant on the populations of waterbirds nesting in the Dnestr Delta. Numbers show the proportion (percentages) of nests in relation to the 1975-1982 average.

Species	1986	1987	1988
INSECTIVOROUS			
Ardeola ralloides	34	4.4	30
Plegadis falcinellus	100	0	22
INSECTI- PISCIVOROUS			
Nycticorax nycticorax	100	35	68
Egretta garzetta	100	28	54
PISCIVOROUS			
Phalacrocorax carbo	100	100	100
Egretta alba	75	33	73
Ardea cinerea	100	100	100
WATERFOWL			
Cygnus olor	35	3.4	100
Anser anser	33	25	28
Fulica atra	46	10	51

water to the delta in a period of about 50 days. The optimum period for these two floods is from 20 April-20 May and then from 20 June-20 July. The flow of the river in these peak periods should be regulated at 500-800 m^3/sec.

There are, however, many more things to be done in order to improve the situation. Overfishing, overhunting, pollution etc. should be properly controlled and delta land uses should be carefully planned and defined. Infrastructure work is also necessary to restore some of the more degraded habitats, e.g. the opening of new channels to improve water circulation, levelling off of unwanted dykes, control of erosion phenomena etc.

Most of all, however, the time has now come to designate the Dnestr Delta as a National Park (350 km^2), with a core area of 80 km^2 as a strict reserve, which includes the most important bird colonies and much of the area of the delta natural habitats. Together with local scientists we have already submitted a full proposal for this, based mostly on ornithological data. Unfortunately, the Ukrainian Ministry of the Environment has not yet accepted this, claiming that fishermen and hunters are opposing such a proposal. We strongly believe that this is the only way to manage the delta as a valuable ecosystem, to safeguard the important breeding populations of so many declining species and to stop and reverse the loss and degradation of one of the most important coastal wetlands in the Black Sea-Mediterranean region.

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