Danube Delta: The Transboundary Wetlands (Romania and Ukraine)

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Abstract

The Danube Delta (4,455 km^2) is the second largest delta in Europe after the Volga Delta, shared by Romania (3,510 km^2 (79%)) and Ukraine (945 km^2 (21%)). It forms part of a large wetland region including several limans, large lakes that formed when the Danube permanently flooded the lower parts of the valleys of tributary rivers (about 6,496 km^2). The Danube River branches are the main conduits of water and sediments discharged through the Danube Delta, and a large diversity of natural, partially man-modified and anthropogenic ecosystems (30) have formed, hosting a wide variety of taxa with 7,402 species recorded to date. In addition to supporting a high level of biodiversity, the Danube Delta Region provides many ecosystem services including its important effect on water quality and nutrient retention, and provision of extensive economic and environmental benefits to the local communities (about 200,000 inhabitants) living in and around the Delta. The management of the Danube Delta should consider short and medium term needs including a wetland restoration program to increase the

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natural flooded area in abandoned polders, measures to reduce the impact of the more ecologically damaging economic activities including navigation and related hydrotechnical works and over-exploitation of natural resources, and transboundary cooperation.

Keywords
Danube river · Danube delta · Liman · Reed bed · Meadow · Riparian willow formation · Shrubs and herbaceous vegetation · Temperate riverine forest · Wetland restoration · Ecosystem service · Transboundary cooperation · Ramsar Site

Introduction

The Danube Delta is located in the eastern part of Europe and shared by two countries: Romania and Ukraine. At the terminus of the second largest river in Europe, the head of the Danube Delta is located near the towns of Tulcea (Romania) and Izmail (Ukraine), where the river divides into two branches: the northern branch known as the Chilia (Kilia) marks the natural border between Romania and Ukraine (120 km), and the southern branch known as the Tulcea (17 km) splits 10 km downstream and east of the town of Tulcea into the Sulina (63.7 km) and Sfântu Gheorghe (69.7 km) branches. The Danube Delta (4,455 km^2) is the second largest delta in Europe after the Volga Delta, shared by Romania (3,510 km^2 (79%)) and Ukraine (945 km^2 (21%)). It forms part of a larger wetland region including several limans (Kagul, Jalpug, Katlabuh, Kugurluj, etc.), large lakes that formed when the Danube permanently flooded the lower parts of the valleys of tributary rivers, along the left side of the Chilia (Kilia) branch (468 km^2) in Ukrainian territory (Chernichko et al. 2003), and former marine bays (1,331 km^2) and other permanent flooded areas (242 km^2), in the southern part of the delta in Romanian territory, together forming about 6,496 km^2 of transboundary wetlands (Fig. 1).

Hydrology

The Danube River branches are the main conduits of water and sediments discharged through the Danube Delta. Before splitting in the Danube Delta, the Danube River has a multiannual average annual discharge of about 6,515 m^3/s (1921–2000 period). During this period, the maximum discharge was recorded in 1970 (15,540 m^3/s) and the minimum (1,350 m^3/s) in 1921 (Bondar 1993). The Danube River transports higher volumes of water during spring and at the very beginning of winter, while the discharge is smaller in the summer-autumn period.

The Chilia (Kilia) branch carries the highest water and sediment discharge in spite of the decreasing trend recorded during recent decades: 63.8% in 1950, 63% in 1960, 60.8% in 1970, 59.1% in 1980, and 58% in 1990. The Tulcea branch carries 42% of the total discharge, with an increasing trend from 28% recorded in 1921, this

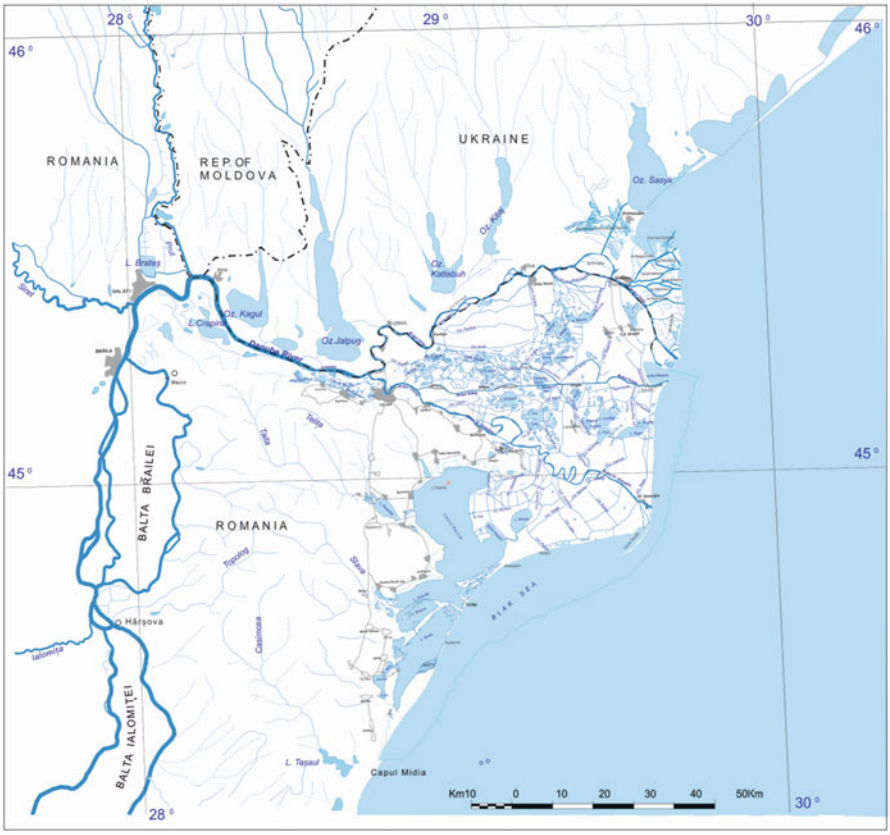

Fig. 1 Transborder wetlands in the Danube Delta, Romania/Ukraine (Map compiled in the Danube Delta National Institute (DDNI))

discharge being distributed to the Sulina branch (19.5%) and Sf. Gheorghe branch (22.5%). The recorded changes in water and sediment discharge distribution among the Danube River branches are the consequences of the main hydrotechnical works that have been implemented in the Danube Delta during the last 150 years, such as the deep navigation channel on the Sulina branch (1862–1902), and the dredging works for cutting the meanders of the Sf. Gheorghe branch (1984–1989). It is estimated that most of the total water discharge of the Danube River (an average of 6,515 m^3/s) flows into the Black Sea through the main Danube branches and only 620 m^3/s (less than 10%) flows through the Danube Delta (350 m^3/s from the Chilia branch, 170 m^3/s from the Sulina branch and 100 m^3/s from the Sf. Gheorghe branch), through the existing channels or over the levees of the Danube branches (Bondar 1993).

The creation and the evolution of the Danube Delta was and still is determined by the sediment discharge of the Danube River in front of the river mouths on contact

with marine waters. The annual sediment transport has changed significantly during recent decades: the average annual suspended sediment discharge was 65.7 million tons/year (1921–1960), 41.3 million tons/year (1971–1980) and 29.2 million tons/year (1981–1990).

Wetland Ecosystems

Taking into account the morphological-hydrographical configuration of the area, its flora and fauna communities and long-term human impact, two main categories of ecosystems have been described consisting of 30 types of ecosystems, namely natural and partially man-modified ecosystems, and secondly, anthropogenic ecosystems. The first category – the natural ecosystems and partially man-modified ecosystems, comprises 23 types of ecosystems, ranging from the Danube branches to the beaches including five main groups of ecosystems: water bodies; wetlands; forests, shrubs and herbaceous vegetation; and open places with little or no vegetation. The second category – agricultural and artificial areas (anthropogenic ecosystems), includes seven types of ecosystems: agricultural lands, forest areas, poplar plantation on the river banks, fish farms and settlements – villages and towns. These are described in more detail as follows.

Water bodies, including

(i) Running waters (lotic ecosystems), represented by the Danube branches, channels and canals with active free water circulation, and canals inside the polders with controlled or no water exchange, and whose margins are dominated by *Phragmites australis, Typha angustifolia,* and floating vegetation when the water speed is low: *Trapa natans, Nuphar lutea, Nymphaea alba, Stratiotes aloides* as well as submerged vegetation: *Potamogeton pectinatus, P. perfoliatus, P. fluitans, Elodea canadensis* and others.

(ii) Standing freshwaters (lentic ecosystems), represented mainly by lakes with large surface area and/or active water exchange and lakes with reduced water exchange, partially covered with floating vegetation. The depth of these lakes fluctuates in terms of the time that they are influenced by the water levels of the main Danube branches: 3–4 m deep during the spring season and 1.5–2 m deep during the summer-autumn seasons. A few lakes are inside the polders with controlled water exchange and water level. The main characteristic of these lakes is the belt-like distribution of vegetation (from the center of the lakes towards their shores). The submerged vegetation forms a more less compact layer in the waterbody which is suitable for phytophilic fauna; including *Ceratophyllum demersum, Myriophyllum spicatum, M. verticillatum, Potamogeton natans, P. perfoliatus, P. pectinatus* and *P. Crispus* amongst others. The floating vegetation, occurring especially in still, sheltered marginal areas (undisturbed by boats), consists of rooted species, e.g., *Nymphoides peltata, Stratiotes aloides,* amongst free-floating species like *Salvinia natans, Azolla caroliniana, Lemna minor, L. gibba*, and *Utricularia* species.

The emergent vegetation forms a belt dominated by *Phragmites australis, Typha sp., Scirpus lacustris, Carex sp., Sagittaria sagittifolia, Polygonum amphibium, Rumex hydrolapatum, Butomus umbelatus, Thelypteris palustris, Symphytum officinalis,* etc.. The floating reed-beds (locally called "plaur") which often form free-floating islands moved by the wind are dominated by *Phragmites australis* and other species of emergent vegetation.

(iii) Standing brackish and salt waters represented by isolated lakes located in the southern part of the Razim-Sinoie lagoon system. The high level of evaporation (caused by the harsh climate) and lack of freshwater input produces high quantities of salt and sapropelic mud.

(iv) Coastal ecosystems represented by lagoons connected (naturally or controlled) to the sea, the semi-enclosed bays and coastal marine waters. These systems vary according to the respective influences of freshwater from the Danube and saltwater from the Black Sea as the connectivity between water bodies along the coast is more open or controlled. The Danube has a major influence on the coastal marine waters, resulting in a certain degree of mineralisation (brackish waters), turbidity and pollution.

Marginal vegetation (wetlands), including

(i) Flooded reed beds that cover large areas, usually in the depressions limited by fluvial or by mixed (fluvial and marine) sand ridges, with a permanent water layer varying from 0.3 to 0.5 m (during the summer and autumn seasons) to more than 1 m during the spring and early summer time. The vegetation is dominated by *Phragmites australis* accompanied by a great floristic diversity including *Typha latifolia, T. angustifolia, Scirpus radicans, S. lacustris, Carex acutiformis, C. riparia, C. elata, Equisetum palustre, Sagittaria sagittifolia, Iris pseudacorus, Glyceria aquatica, Mentha aquatica, Salix cinerea, Thelypteris palustris, Polygonum amphibium, Ranunculus lingua,* etc.

(ii) Floating reed beds, constructed of the roots (rhizomes) of *Phragmites australis* and other plants. The base of the bed (0.5–1.5 m thick), contains much undecayed organic matter and humus. The dominant plant of this ecosystem is *Phragmites australis* joined by species such as *Typha angustifolia, T. latifolia, Scirpus lacustris, S. radicans, Rumex hydrolapatum, Thelypteris palustris, Sagittaria sagittifolia, Carex* spp., *Stachys palustris, Oenanthe aquatica, Cicuta virosa, Galium palustre, Rorippa amphibia, Lythrum salicaria, Salix cinerea,* etc.

(iii) Riparian willow formations, occurring on sand ridges of fluvial origin covered by a relatively wide diversity of willow forests *(Salix alba, S. fragilis, S. pentandra, S. aurita, S. cinerea),* where flood conditions last for a longer period. *Populus alba, Alnus glutinosa, Fraxinus angustifolia* also occur. In association with the above-mentioned species, *Amorpha fruticosa, Rubus caesius* and a layer of shorter vegetation occurs, consisting of *Equisetum palustre, Polygonum hydropiper, Stellaria aquatica, Raphanus raphanistrum, Rorippa palustris, Potentilla reptans, Symphytum officinale, Solanum dulcamara,* etc.

Forests, shrubs and herbaceous vegetation, including

(i) Temperate riverine forests, consisting of mixed oak woods with several tree and bush species: *Quercus robur, Q. pedunculiflora, Fraxinus angustiflora, F. pallisiae, Ulmus foliacea, Populus alba, P. canescens, P. tremula, Salix alba, Tilia tomentosa, T. cordata, Malus silvestris, Pyrus pyraster, Corylus avellana, Prunus spinosa, Crataegus monogyna, Rosa canina, Rhamnus frangula, R. catharticus, Euonymus europaea, Cornus mas, C. sanguinea, Hippophae rhamnoides, Tamarix ramosissima.* Sometimes, their stems are covered by climbing plants like *Hedera helix, Vitis sylvestris, Humulus lupulus, Clematis vitalba, Calystegia sepium and Periploca graeca.*

(ii) Shrubs and herbaceous vegetation, including very limited sites for shrubs and herbaceous vegetation on calcareous cliffs where the dominant plant species are represented by *Artemisia santonicum, Limonium gmelinii, Halimione verrucifera, Lepidium cartilagineum, Camphorosma annua, Halocnemum strobilaceum, Leuzea salina, Taraxacum bessarabicum,* etc., and steppe meadows dominated by *Thymus zygoides, Festuca callieri, Melica ciliata, Althea rosea* and *Convolvulus cantabrica.*

(iii) Meadows on loessial plains, developed on the sand ridges of fluvial origin or marine levees. Depending on the specific environmental conditions, the vegetation is dominated in the slightly inclined, frequently flooded marginal areas, by associations with *Agrostis stolonifera* and *Trifolium fragiferum.* During summer, the halophilous species show a certain degree of salinisation *(Juncus gerardi, Suaeda maritima, Puccinella distans).* In higher horizontal levels that generally remain unflooded, and where the phreatic water table occurs at depths of 2–3 m, apart from the above-mentioned species, *Aleuropus littoralis* (a species indicative of highly saline soils) can be found.

(iv) Meadows on low marine levees that are up to 2 m high and largely covered by water during the spring time, supporting specific vegetation – the main factor influencing the vegetation being the distance to the Black Sea. In higher places, with half-shifting sands, the dominant species are adapted to sandy rather than saline soils. Typical species of the sandy environment include *Festuca arenicole, Ephedra distachya, Carex colchicum, Elymus giganteus, Apera spica-ventu* (ssp. maritima), *Plantago maritima, P. coronopus, Centaurea arenaria, Convolvulus persicus, Gypsophila perfoliata and Stachis maritima.*

Open places with little or no vegetation, including

(i) Dunes with shifting or partially shifting sands, partially covered with vegetation, found on the beach ridge and dune complexes. Typical vegetation includes *Stipa borysthenica, S. pulcherrima, S. capillata, Convolvulus persicus, Dianthus pontederae, Silene thymifolia, Fumana procumbens, Scutellaria altissima, Trifolim dubium, Papaver maeoticum, Melampyrum arvense, Falcaria vulgaris* and *Botriochloa ischaemum*.

(ii) Weakly consolidated coastal sand-belts that are frequently flooded by marine waters, especially during stormy weather. The vegetation is dominated by sand-loving species such as *Festuca arenicola, Ephedra distachya, Carex colchicum,*

Elymus giganteus, Apera spica-ventu (ssp. maritima), *Plantago maritima, Centaurea arenaria, Convolvulus persicus, Gypsophyla perfoliata, Plantago coronopus. Stachys maritima and Helichrysum arenarium. Hippophae rhamnoides* is found in some places.

(iii) As part of the above-mentioned coastal sand-belts, beaches are generally barren. If plants occur, they have a patchy distribution, few specimens being grouped together. In most areas the beaches are expanding. Beaches width ranges from 5 to 100 m. Generally, the narrow beach strips (washed by the sea-waves) are built of sandy matter of organic origin and pieces of shells (Gâştescu et al. 1998).

Agricultural land and artificial areas (anthropogenic ecosystems), including polders (areas that have been isolated from the surrounding hydrological system by dikes, with controlled water regime) dedicated to agriculture, forestry, fish farming, mosaic polders and abandoned ones in process of ecological restoration; as well as poplar plantations on river levees, and urban and rural settlements. The first polder in the Danube Delta was built in 1939 for agriculture, and by 1990 the total area of polders had increased to about 96,000 ha, including polders for agriculture, fish farming and forests. The man-made changes brought about through diking, drainage and use of fertilisers and pesticides, transformed the natural ecosystems into simplified systems – monocultures of cereals, poplar plantations of Euro-American species (covering 97% of the total area of forested polders) and intensive fish culture. These polders are considered to be detrimental to the natural ecological balance, causing a decrease in biodiversity (Gâştescu et al. 1998).

In conclusion, indigenous vegetation largely prevails in the Danube Delta although major reclamation works have been carried out for agriculture, fish farming and polders for planted forests. The natural marsh and aquatic vegetation are most widespread in the Danube Delta, covering 398,676 ha in the Romanian part and 35,711 ha in the Ukrainian part of the Delta (Hanganu et al. 2002).

Biodiversity

The Danube Delta supports a wide variety of taxa with 7,402 species recorded to date including, according to "Universal Taxonomic Services" and "Sistema Naturae 2000" (Brands 1989–2005): Plants (2,383 species), Animals (4,026 species), Fungi (145 species), Protozoa (429 species), Chromista (210 species) and Bacteria (209 species). This high number is due to the great variety of terrestrial, wetland and marine habitats (30), which form part of the steppic and pontic bio-regions protected within the Natura 2000 Network, and the proximity of several sub-zones of the Palearctic faunal region (e.g., Mediterranean, Pontic, Eurasian) (Management Plan of DDBR: Romanian Government 2015).

Invertebrates form by far the greatest part of the fauna in the Danube Delta, with a total of more than 3,000 species. Of these, there are some 255 species of worms, 84 species of molluscs, 223 species of crustaceans, 168 species of arachnids, 98 species

of miriapods and 2,260 species of insects. To date, 38 species of invertebrates have been described for science from the Danube Delta, including a worm *Proleptonchus deltaicus,* 5 species of arachnids, and 32 species of insects such as *Isophya dobrogensis, Dialulinopsis deltaicus,* and *Homoporus deltaicus*. 26 species of insects are known only from the Danube Delta (Management Plan of DDBR: Romanian Government 2015).

The fish fauna of the Danube Delta is represented by 135 species belonging to 30 families. The majority of these are freshwater species, the others being euryhaline species that live in the Black Sea and visit the delta mainly during the breeding season (including the sturgeons: *Huso huso*, *Acipenser guldenstaedti, A. stellatus, A. nudiventris,* the Danube Shad *Alosa pontica*, etc.). About one third of these species are exploited by intensive commercial fisheries.

The amphibians are represented by 10 species of frogs and toads, including *Rana ridibunda, Bombina bombina, Hyla arborea, Pelobates fuscus, Bufo bufo, Bufo viridis* and two species of newts, *Triturus dobrogicus* and *T. vulgaris.* The reptiles include terrapins, lizards and snakes. All the amphibians and reptiles are protected in Europe through the Bern Convention. The Danube Delta is most famous for its birds, with a recorded total of 341 species (out of about 520 in Western Europe as a whole). The site is of global importance for breeding populations of many waterbirds such as great white pelican *Pelecanus onocrotalus*, Dalmatian pelican *P. crispus* and pygmy cormorant *Microcarbo pygmaeus*. In addition there are important colonies of Eurasian spoonbill *Platalea leucorodia*, and several breeding pairs of white-tailed eagle *Haliaeetus albicilla*. The Danube Delta region is a major migratory stop-over area in both spring and autumn for several million birds, especially ducks, white stork *Ciconia ciconia* and various birds of prey. In winter, the region also hosts large flocks of swans and geese, including at times almost the entire world population of the threatened red-breasted goose *Branta ruficollis* (Goriup et al. 2007). There are 54 species of mammals including some terrestrial species of European importance such as Eurasian otter *Lutra lutra* and Eurasian mink *Mustela lutreola,* stoat *Mustela erminea*, European wildcat *Felis silvestris,* as well as marine species: short-beaked common dolphin *Delphinus delphis* and bottle nose dolphin *Tursiops truncatus.*

Several invasive species have been recorded, especially in the Black Sea: warty comb jelly *Mnemiopsis leidyi,* soft-shell clams *Mya arenaria,* the bivalve mollusc *Scapharca inaequivalvis,* the crustacean *Balanus improvisus* and the gastropod mollusc *Rapana venosa.* The flowering shrub *Amorpha fruticosa* (Fabaceae) is invading the levees of Danube branches.

Conservation Status

In 1991, an area of 647,000 ha of wetlands was declared as a Wetland of International Importance under the Ramsar Convention (Ramsar Site) on the Romanian side of the Danube Delta region, and later on in 1995, several wetlands with a total area of 60,800 ha were declared as a Ramsar Site on the Ukrainean side of the Delta. Prior to this designation, several protected areas existed within the Danube Delta region in both sides of the border covering 626,403 ha, namely:

(i) Letea Forest Nature Reserve, 500 ha, established in 1939 (Romania);
(ii) Danube Delta Biosphere Reserve (DDBR), 580,000 ha, established in 1990, including Letea Forest Nature Reserve (Romania);
(iii) Kilia Delta Reserve (1 km wide coastal strip of the Kilia Delta), established in 1967 (Ukraine);
(iv) Dunaiski Plavni Reserve, 14,851 ha, established in 1981 (Ukraine);
(v) Danube Biosphere Reserve (DBR), 46,403 ha, established in 1998, including both the Kilia Delta Reserve and the Dunaiski Plavni Reserve (Ukraine) (Baboianu et al. (2004))

The management of the Danube Delta in Romania is mainly based on the special law, 82/1993 (updated in 2011), concerning the establishment of DDBR, the law 265/2006 for environment protection, and the law 49/2011 concerning the protection of biodiversity and protected areas. According to existing legislation, visitor access is allowed in the Danube Delta based on entrance permit, and on special permit to the core areas (strictly protected areas) for scientific purposes only. Economic activities are allowed with the authorisation of the Reserve Authority. Most of the land is state owned (82%), or owned by the local authorities (17%). Only 1% of the total land area is privately owned. Wetlands cover about 40% of the total area of the Danube Delta. The management of the Danube Delta in Ukraine is based on the Law of Nature and Reserve Fund of Ukraine 2456-XII/1992 and two Decrees of the President of Ukraine. Entry to the reserve and traditional economic activities (reed harvesting, commercial fishing, tourism, cattle grazing, etc.) in the reserve teritory (which is totally state owned) are allowed based on permits issued by the reserve administration (Baboianu et al. 2004).

Ecosystem Services

In addition to supporting a high level of biodiversity, the Danube Delta Region provides many ecosystem services. It has an important effect on water quality, and nutrient retention, especially for the Black Sea ecosystems. Moreover, it provides extensive economic and environmental benefits to the entire region: the socio-economic benefits of the wetlands to local communities living in and around the Danube Delta are very important. Practically, all aspects of the lives of the delta's 200,000 inhabitants are related to water in one way or another. The Danube River and its branches, and several canals are the major sources of water for industrial, agriculture (irrigation) and domestic use for local communities. They are also used for navigation by both commercial and public ships and vessels, boats and canoes. The main natural resources represented by fish, reed, pasture, natural and planted forests support traditional economic activities undertaken by local communities. The fishery is far the most exploited resource, with about 7,000 t per year supporting commercial, subsistence and recreational fishing, mostly consisting of fresh water species. The reed beds have the potential to produce about 40,000–50,000 t of reed per year, and the pastures support grazing sheep, cattle, pigs, and horses. The use of

reed has a long history in the Danube Delta, with local people building shelters for fishermen, refuges for cattles and sheep, roofs for houses, fences for yards, etc. When used for thatched roofs elsewhere in Europe, it would imply that significant income is obtained. The paper industry used the reed as raw material for producing paper and cellulose, until the collapse of this activity in the late 1980s. While not permitted on the Romanian side, hunting is permitted on more than 60% of the Ukrainian part of the Danube Delta. Agriculture is practiced, both in polders for cereal crops (wheat, barley, maize), sunflowers, and, on a smaller scale, for family needs (vegetables, fruit trees, vineyards).

Threats

The first major human intervention in the Danube Delta started in the 19th century with measures that were taken to improve navigability and to support agricultural exploitation in the Delta. The consequences of these interventions, however, remained without major impact on the homogeneous natural integrity of the river and delta. A development program for building dams and canals necessary for establishment of agricultural polders, reed harvesting, fishing and fish farming, and silviculture started in 1960, and significantly altered the network of watercourses between the main branches, as mentioned in the section onhydrology. Many areas were cut off from the Danube's natural water level fluctuations, and their water balance and the exchange of waters in the Delta was completely disturbed. This also disturbed the Delta's interdependent ecosystems. The complex Delta transformation programme adopted in Romania in 1983 foresaw more intensive land use, which necessarily implied the erection of further dams and large-scale drainage works (Gomoiu 1996). As a consequence, the natural habitats of numerous plant and animal species were reduced and partly destroyed. The Danube Delta wetland complex with its broad reed areas (180,000 ha) which act as a filter for the ecological balance in the Black Sea, had been considerably affected. The cutting of the meander bends of the Sf. Gheorghe Branch in 2000, in Romania, was followed by the Deep Navigation Route development (Bystroe) in Ukraine, in 2004, affecting the habitats and the hydrology of the River. More than 96,000 ha of wetlands and reed beds, many of them acting as important spawning areas for cyprinids or nesting areas for birds, were drained for agriculture, fish farming, and artificial forests, as mentioned above (Agricultural land and artificial areas). The effects of the changes within the delta was amplified by the impacts of human activity outside the area: land reclamation works in the flood plains of the River Danube and its tributaries, and the construction of dams and sluices for regulating navigation and for hydro-power plants, etc., eliminated the important areas of wetland habitats and reduced the sediment load reaching the delta. Wetland restoration in several polders (totalling about 15,000 ha), works for improving the water circulation through the delta (canal closures and calibration), and waste water treatment plants are some of the measures taken to mitigate human impacts.

Future Challenges

The management of the Danube Delta should take into consideration several needs for the short and medium terms. In the short term, the implementation of a wetland restoration program to increase the natural flooded area in abandoned polders for agriculture and fish farming should be continued. In addition, measures are needed to reduce the impacts of the more ecologically damaging economic activities (including navigation and related hydrotechnical works, over-exploitation of natural resources (especially fish)) and other landuses according to the carrying capacity of the ecosystems and pollution control. The living standards of local communities should be improved through the extension of drinking water supply, waste water treatment networks, waste management, green energy use, and the involvement of the local communities in the direct management of the wetlands and their resources is another urgent need.

In the short and medium terms, the development of transboundary/transnational cooperation between Ukraine and upstream riparian Danubian countries should be taken into consideration for implementing regional cooperation programs such as the *Lower Danube Green Corridor* between Romania, Bugaria, Republic of Moldova and Ukraine, the *Trilateral Agreement for joint management of transboundary protected areas* in Romania, Ukraine and Republic of Moldova, and the development of the *Network of Protected Areas of the Danube River – DANUBEPARKS* within the EU Danube River Strategy.

The joint projects implemented during the last decade in the Danube Delta Transboundary Biosphere Reserve in Romania and Ukraine, and the Lower Prut River Reserve in Romania and Republic of Moldova, were focused on developing cooperation in the Lower Danube Region to develop monitoring, biodiversity and habitat conservation, wetland restoration, public awareness and to establish the Transboundary Biosphere Reserve of the Danube Delta and Lower Prut River in Romania, Ukraine and the Republic of Moldova.

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