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Danube Delta: a natural gateway to Europe

Ecology and Economy in Harmony

Vision summary document

28 January 2007

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Foreword

The future of the Danube Delta is at a crossroads. While the region has great economic potential, current development trends threaten its very essence – the Delta's unique ecological value. This document describes a Vision for the Danube Delta that aims to safeguard its biodiversity whilst reaping socio-economic benefits for local people.

Several organisations, including the Danube Delta National Institute (RO) and the Danube Delta Biosphere Reserve Management Administrations (RO and UA), along with many outstanding scientists, have been working for decades to understand the Delta and its people that have managed and protected it for centuries.

WWF has also provided a contribution, although more recent. The WWF Danube-Carpathian Programme has been working in the Ukrainian part of the Delta for several years already. A "Partners for Wetlands" (PfW) project, funded by WWF Netherlands, just ended in June 2006, but not without highly successful results. A joint Vision for the Ukrainian Danube Delta with key stakeholders has already been developed. Three restoration sites have been implemented to implement the Vision, along with the close cooperation has been established with local authorities and partners in the area.

This "extended" Vision (for the entire Danube Delta, including the territories of Romania and Ukraine) will continue with activities for the final stage of implementation that started during the PfW project. WWF Germany and the WWF Aueninstitut have been working in the Romanian Danube Delta for over a decade. Here, restoration work and a partner network have also been established. WWF DCP Romania now works with the Aueninstitut and local partners on these issues.

To conclude, the role that WWF offers to play in the Danube Delta with local and regional partners is to:

- Develop and shared Vision for the Danube Delta
- Establish model sites to show the implications of the Vision
- Communicate the Vision and model site results
- Magnify positive results to other parts of the Danube River Basin and the Black Sea region

How should this document be used?

The term “Vision” is often used in action plans which combine social, economic and ecological elements. A **Vision** is a broad outline, set of ideas, and/or concept for a desirable future for a territory. It should steer and give direction to future development.

In spite of the apparent simplicity of a Vision, it is impossible to present a feasible and desirable future for any territory without well-reasoned analysis of its past and present.

The Vision presented here is the result of such a careful analysis, which seeks to unify a diverse range of components in one model for the welfare of future generations, in harmony with their environment.

This Vision summary document is intended for interested experts and decision-makers at all levels in Romania, Ukraine, and elsewhere. The Vision presented here has been developed in consultation and discussed with the following partners and stakeholders, including:

- Danube Delta Biosphere Reserve Administration, Tulcea, Romania
- Danube Delta Biosphere Reserve Administration, Vilkovo, Ukraine
- Danube Delta National Institute, Tulcea, Romania
- Izmail State Forestry, Ukraine
- Odessa Oblast Water Management Board and Task Force, Ukraine

The **visioning process** involved a thorough analysis of the Delta’s past and current situation, including a detailed description of the key processes that support biodiversity and in the Delta. This analysis included site visits, consultations and input from experienced and knowledgeable Delta experts, and discussions with local residents and business owners.

The Vision takes current programmes and plans of the Danube region into account. It has been prepared to support the ongoing Delta management activities in Romania and Ukraine, and to support efforts towards an integrated plan for the entire Delta, particularly with respect to the WFD sub-basin plans underway.

The main proposals made here **compliment the activities of other organisations in the region**. The document is intended to be used as a source of ideas which can be integrated into existing and forthcoming development plans and initiatives, as well as a basis for development of partnerships between WWF and other organisations/decision-making bodies that aim to implement the ideas of the Vision.

The Vision is also based on past success of successful restoration work in the Ukraine by key partners in collaboration with WWF. For this, experience of over 15 years of partnership with Danube Delta management and research authorities, and WWF’s own six years of direct work in the Danube Delta was referred to.

The document contains **technical and scientific information on the Danube Delta system**, an approach to restoration initiatives in the area, and suggestions for sustainable use of natural resources, as well as income-earning opportunities for the local Delta population.

The Vision proposed in this document sets out a technical and scientific framework for an approach to floodplain restoration in the Danube Delta, and examines what the implications may be for management of different types of habitats and economic activities. The Vision is not a programme of implementation; this is the next step (drawing on the experience of model projects), and would need to be accompanied by specific

action plans and detailed projects.

Further economic and environmental action plans may be needed for implementation of the Vision in different areas of the Danube Delta. This Vision **does not intend to answer all the questions or solve all the problems** in the area, or those that arise out of implementation of the Vision itself. It **proposes a direction for further efforts** in order to guarantee the long-term solution of the environmental problems of the Danube Delta, and the sustainable economic development of the region.

1 Understanding the Danube Delta

The extraordinary ecological richness and the biodiversity of the Danube Delta is due to its:

- Geographical position on a major migration route between northern and southeastern Europe
- Sheer vastness
- Internal differentiation
- Position at the end of a large river system
- Living, underlying physical processes that are responsible for the ever-changing environment

Important socio-economic aspects of the Danube Delta include:

- It is part of the a river-sea-river shipping network, as well as one of Europe's important transport routes (Black Sea-Danube-Rhine-North Sea)
- Good spatial distributions of urban/industrial activities, as most of these activities are located on the outskirts of the Delta.
- Opportunities for the local population to earn income from natural resources and sustainable activities.

1.1 The Danube Delta in general

DANUBE DELTA FACTBOX

Total area: 626,403 ha

Core area(s): 73,262 ha (of which marine: 1,300 ha); Romania: 50,600 ha, Ukraine: 22,662 ha

Buffer zone(s): 160,673 ha (of which marine: 136,686 ha); Romania: 223,300 ha, Ukraine: 19,687 ha

Transition area(s): 310,154 ha; Romania: 306,100 ha, Ukraine: 4,054 ha

Location: The area where the Danube River flows into the Black Sea. The Lower Prut River, running through Moldova and Romania, is also considered part of the lower Danube river system, which covers about 14,400 ha.

Major ecosystem type: Temperate wetland delta and marine/coastal zone

Main river channels (% flow): Kiliya (58%), Sulina (19%), Sf. Gheorghe (23%)

Altitude (metres above sea level): Romania: -39 to +47, Ukraine: -8 to +4.5

Administrative authorities: Romania: Danube Delta Biosphere Reserve Authority; Ukraine: Administration of the Danube Biosphere Reserve; The Ministry for Ecology and Nature Resources of Ukraine; National Academy of Science of Ukraine

International recognition: RAMSAR Wetland of International Importance, UNESCO World Heritage List, Biosphere Reserve under UNESCO's Man and the Biosphere Programme

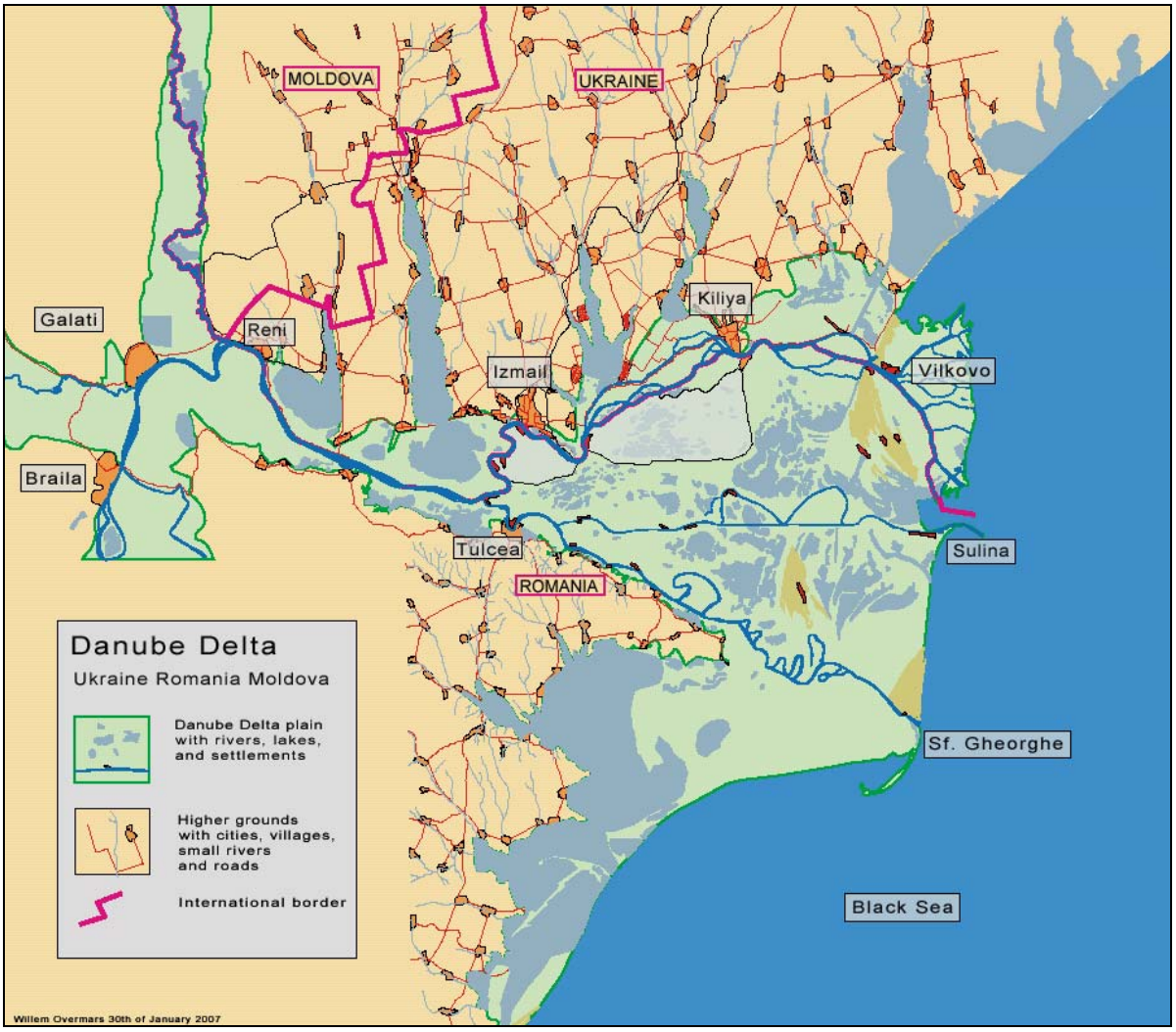

Figure 1: Map of the Danube Delta (Credit: Willem Overmars)

The processes of water and sea have formed the Delta assisted by climate and water events over thousands of years. The Danube River and its three main branches (Kiliya, Sulina and Sfantu Gheorghe) carry millions of tons of silt and sediment that accumulate on the river-sea border, forming the basis of an intricate and picturesque mosaic landscape.

Due to this diverse landscape, the Delta is one of the richest European ecosystems inhabited by over 4,000 species of flora and fauna. The Delta is an indispensable stepping stone along the Afro-Eurasian bird migration route and lies at the heart of several land, river and marine ecological corridors in the northwest Black Sea region. Plant diversity contributes to landscape variations together with the grazing habits of domestic and wild herbivores.

For the development of this Vision, the Delta has been considered in three main sections: **the outer Delta, the inner Delta, and the lower Danube River system**. A series of background studies were carried out on each of these sections. The main findings are summarised in the next sections.

1.1.1 The outer Delta

Figure 2: The seaside and outer area of the Danube Delta

The Danube Delta is the result of the meeting of the Danube River and the Black Sea over a period of 13,000 years under changing circumstances with water levels of the sea.

The Delta was always able to interact with the sea; most of the time it grew with the sea. Sometimes parts eroded away. At the shoreline, the sea dominates, although the influence of the mighty Danube River is strong.

As long as enough sediment available, the Delta still will be able to adapt with the sea. At the seaside, new and higher sandbanks will be formed, and older ones (behind the seafront) will eventually be taken over by lakes and reedbeds of the inner Delta. This has been happening for thousands of years. In the inner Delta, the influx of sediment-rich river water, growing peat layers and floating peat complexes will allow the Delta to grow with the sea as well.

1.1.2 The inner Delta

The inner delta is an intricate maze of wooded riverbanks, levees, lakes, reedbeds and plaur[1]. As there is more evaporation than precipitation in these areas, the lakes would dry out or become increasingly saline without being fed by freshwater from the branches of the Danube. The water circulation system in this area is extremely complicated, with the many connections to the river branches and their changing water levels, as well as all the interconnections within the Delta itself. There are many sudden and subtle gradients in the Delta, which are reflected by the diverse communities of plants and animals.

1.1.3 The lower Danube

The lower Danube is the only stretch of a large, unregulated river in Europe. The actual riverbed is still characterised by moving sandbanks and islands, with a rhythmical sequence of riffles and pools. During floods, large amounts of sand and silt are transported downstream. This sediment flux is not a steady one; sediment does not flow continuously from the Iron Gate II dam (the last blockage of the Danube before the free-flowing stretch of the lower Danube starts) to the Black Sea. Sediment transport occurs in interrupted waves, mainly during floods. Sediment eroded from the river's shore will be transported a few kilometres, and then deposited again.

The lower Danube flows in a valley ranging in width from five to more than 20 km. Higher grounds form a natural border to the floodplain along both river banks, with the Bulgarian side being significantly higher in some parts.

In a natural situation, the main river slowly moves laterally from one side of this valley to the opposite side, and back again. In the case of the Danube, with a low flow velocity, this process is very slow; full lateral movement of the river would take centuries. By doing so, all the sand and silt in the entire floodplain is on the move. In fact, the entire sediment layer of about 10 meters thick over the total width of the floodplain, in its natural state, moves very slowly downstream. A natural river has an enormous supply of sediments, available over a very long period.

1.2 Natural processes of the Delta

Natural processes in the Danube Delta are dominated by the river and the sea. River dynamics in the form of rising and falling water, accompanied by erosion and sedimentation, shape the landscape. At the coast, the sea gains the upper hand by re-shuffling the sediment originating from both the sea and the river.

Plant growth responds to abiotic processes by producing immense reedbeds and gallery forests along the rivers. Large herbivores make an impact on the landscape by changing the composition of the vegetation and they too change their behaviour acording to the impact of changeing water levels and weather conditions.

While all these processes are inter-dependenet and therefore difficult to seperate. The function of the river tends to be most influential on the inner areas of the Delta. The influence of the sea influences the outer Delta the most. The formation of vegetation and influence of grazing animals also affects the natural state of the Delta.

The foundation of this Vision is understanding these natural processes in the Danube Delta system.

[1] Plaur are floating islets in the Delta made up of reeds and other aquatic plants, mixed up with organic remains and soil. These islets can provide habitats for various birds and other animal species.

1.2.1 Erosion and sedimentation

The transport of water and sediment in the Danube River play the main role in the past, present and future state of the river and the Delta through erosion and sedimentation in various forms. The Delta will change continuously: it will grow in places, and erode in other places. The most important prerequisite here is that the river must continue to deliver ample sediment to the Delta, and that this sediment is deposited in the "right" places. In turn, the Delta will be able to follow the rise and fall of the level of the Black Sea as long as enough sediment is delivered from the hinterland for vertical (elevation) growth of both the inner and outer parts of the Delta.

The Danube River carries 30 million tons of sediment every year to the Delta. Only silt and fine sands reach the Delta, due to the low velocities of the current in the extremely flat Danube Delta. 1.5 million tons of sediment are deposited in the Delta itself, and is thus used for the vertical growth of the Delta. Most of the sediment is not used in the Delta, but just passes through it. The remaining silt disappears into the Black Sea, and is used for expansion of the Delta. The amount of sediment influx to the Delta has decreased sharply during the twentieth century (67.5 million tons/year from 1921-1960, 41.3 million tons/year between 1971-1980, and 29.2 million tons/year from 1981-1990)[2]. This decrease is mainly caused by the construction of dams in the tributaries of the Danube, and in the Danube itself (this is explained in more detail in Chapter 2.1). Nevertheless, it seems the amount of sediment that reaches the coastal sandbar in the Kiliya and the Sf. Gheorghe delta areas is enough to keep them growing[3].

1.2.2 Wind and waves

Water and sediment from the river meet at the shore of the Black Sea. Here, strong currents, winds, and waves exercise new forces on the sediment, which subsequently forms the coastal landscape through sandbars. The sandbars develop parallel, north-south, to the coastline and this perpendicular to the west-east course of the river. The north-south current transports the sand towards the south, hence the asymmetric, fan-like form of the outer Delta. Locally, the sandbar develops into dunes.

If enough sediment remains available in the future, the Delta will be able to continue its horizontal (seaward) growth; the seafront will grow in height as well.

1.2.3 Salt and salinisation

Salt plays an important role in the dry steppe climate of the Delta and lower Danube. The effect of salinisation differentiates between forests and meadows, reed and rush marshes, and it strongly influences human agriculture activities.

In a region where evaporation is far greater than precipitation, salts from the groundwater tend to concentrate in the upper layers of the soil. Long and regular floods counteract this process by flushing out salts. The system itself moderates the negative impacts of the dry climate.

The long and narrow limans in the drowned river valleys to the north have a tendency to accumulate nutrients and salts even under natural conditions. During floods, water from the Danube enters the limans, increasing water levels. In times of low water, the shallow limans empty almost completely into the Danube (at least those limans that have not been hydraulically modified by man). The rhythm of regular inflow and outflow of water can be seen as the "breathing" of the lakes, whereby freshwater is brought into the limans

[2] Monteanu, I. (1996) Soils of the Romanian Danube Delta Biosphere Reserve.
[3] The mean annual growth of the Kiliya Delta is about 40-80 meters/year over the last 100 years.

and accumulated salts are carried away.

1.2.4 Flooding

Flood events in the Delta influence the landscape every year; they occur naturally and help form the basis of the natural system. Some events take place only once in a century, and some flooding processes take less than an hour. On average, flooding and its effects in the Delta last about four months. In general, the area, depth of flooding and water volume are connected with the water level in the Danube River. Until the main branches of the Danube were embanked and the polders were formed, the total flooded area reached 95% at high water levels. Embankment reduced the flooded areas by more than half.

1.2.5 Vegetation and succession

Sometimes vegetation itself forms landscapes. Where riverbanks have developed, the land is high and dry enough for the development of alluvial forests. The lakes, smaller channels and canals are hosts to a range of aquatic plants. The strong tendency to develop reedbeds and forests can be considered as a landscape forming process. Intricate interactions and counterforces cause the development of a mosaic of these main vegetation types.

Gallery forests: As the banks of the river are relatively high, there is strong tendency towards forest formation. On the drier lands of forest, willow, white poplar, ash and occasionally elm, hawthorn, blackthorn and wild pear are found. Where the soil is wetter, only willow remains. As the highest elevations border the rivers, monumental ridges of tall forests trace the river courses across the landscape (gallery forests).

Reed: The terrain becomes gradually wetter in the direction of the lakes that lie behind the riverbanks. Here, the soil is too wet for forest, and reed becomes the dominant form of vegetation. Reed is found different forms: a) in the immense reedbeds themselves, b) in the thick layers of peat[4] made up of accumulated reed and other plants, and c) as plaur. Reed cannot develop if its stalks are completely flooded in the growing season. In exceptional cases, lengthy inundations (ecological “disasters” that defy the limits of the ecosystem) mean that vast reed expanses die back locally and temporarily.

1.2.6 Natural grazing

Animal activity can form landscapes as well, as in the case of natural/semi-natural and cultural, low-density grazing. Large herbivores have a significant influence on the vegetation of an area, and literally eat a subtle mosaic out of otherwise monotonous vegetation. Grazing transforms monotonous (forest) vegetation into differentiated natural environments. In the Danube Delta, this applies especially to the higher parts of the area, that is the sand ridges, dunes and riverbanks.

Domestic (agricultural) grazing in the Delta tends to operate in densities of 1-5 animals per hectare, whereas natural grazing densities are around 1 animal on 5-50 hectares, depending on climate and fertility of the soil. Overgrazing of domestic animals can lead towards impoverishment of the landscape by diminishing variation in vegetation types.

Remnants of natural grazing still take place in these alluvial forest areas by roe deer and fallow deer. The influence of these animals on the trees and bushes is considerable. Cropped branches encourage new, more bushy growth, thus augmenting the productivity of the woodland. A forest without these “browsers” offers less bountiful food store. With

[4] Peat is an accumulation of partially decayed vegetation matter.

browsers present, there is plenty of food even for the occasional visits of horses and cattle.

Several of the large herbivores, especially horses and feral cattle, prefer to live in open spaces outside forests and shrub, although they may enter the forest for protection against wind, sun, cold and snow. The availability of food in winter and early spring largely determines the number of animals that an area can support without degradation occurring. This means that in late spring and early summer there is more vegetation available than the animals can eat. Thus, herbs grow high and flower freely. In the rougher vegetation some young wild trees are protected and are able to grow. Some of these trees will be eaten in winter, while others will survive and form solitary trees or bushes.

2 Man and the Danube Delta

Use of the Delta's natural resources by humans was in equilibrium for many centuries. However, in the past two hundred years humans have interfered with the Delta in such a way that the natural system has changed.

Man has interacted sustainably with the Delta for thousands of years. The following traditional activities have taken place within the ecological capacity of the system:

- Small-scale hunting, trapping and fishing for the local population's own consumption
- Reed harvesting for fuel and building material
- Collection of medicinal herbs for conventional and homeopathic medicine
- Small scale horticulture for local markets around some villages, i.e. Vilkovo
- Beekeeping for honey production

Over the last century, human influence has increased and become more dominant. The following activities became vital to the Delta region's economy, and were developed at industrial scales in parallel with traditional use:

- Fisheries
- Reed harvesting
- Agriculture

These large-scale activities have not always been successful, including creation of polders for agricultural activities. In addition, shorelines and riverbanks have been defended/reinforced, harbours have been built, and canals have been dug. Dikes were put up, and polders have been pumped dry. All these activities have changed the natural system of the Danube River and the Delta considerably. The ecological state of the Delta is also affected by land use decisions taken upstream, in any of the countries bordering the Danube.

Still, compared to other deltas and estuaries, large parts of the Danube Delta are still intact, and the Delta's underlying natural processes are still in effect.

2.1 The outer Delta

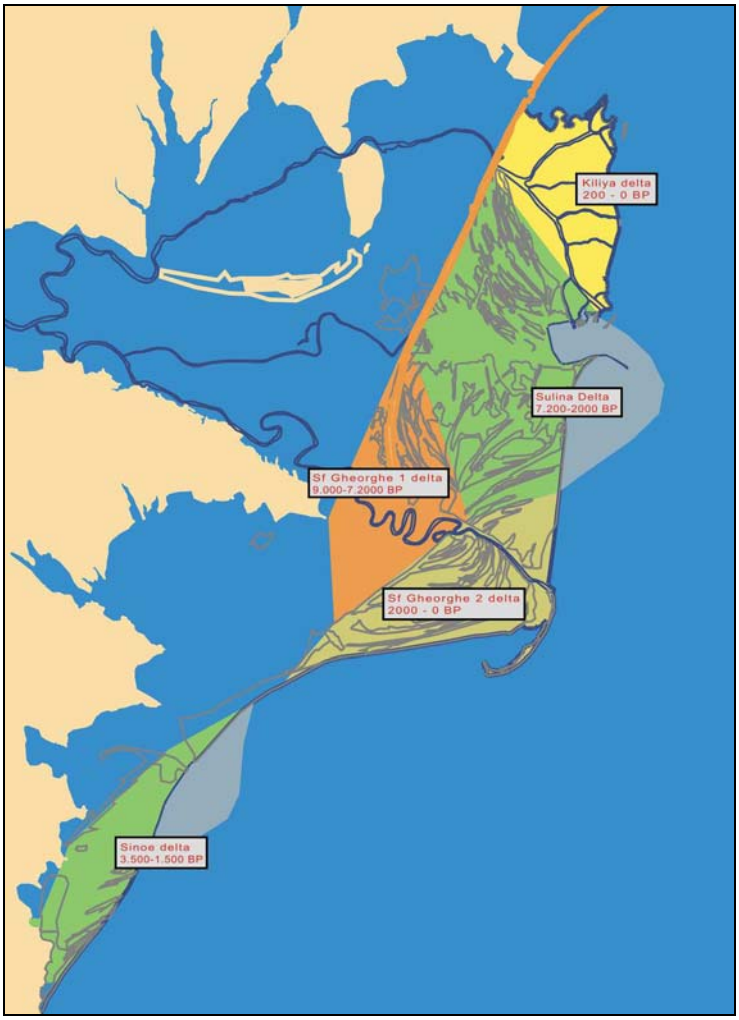

Figure 3: The outer areas of the Danube Delta.

The Kiliya Delta is still a very natural part of the Danube Delta. The underlying natural processes, however, have been culturally determined. This was caused by a sudden flush of sediment in the 19th and 20th centuries from ploughing up the Romanian plains for grain production (see the next section - 2.1.1). The Sf. Gheorghe mouth is still the most natural river mouth in the outer Delta. The Sulina mouth, with its long jetties, blocks the north-south sediment stream along the coast.

2.1.1 The Kiliya Delta

In the last 200 years, there was an abundance of sediment in the Delta, much more than would be the case in a natural situation. This artificially high amount of silt and sand was due to ploughing up large areas of plains in Walachia[5] and Moldova for grain production for West European countries, especially Great Britain. The erosion on the plains caused a stream of sediment into the river. This sediment formed the river-dominated Kiliya Delta at the place where it reached the Black Sea (see the map in Figure 2 above). Around 1944, the morphological behaviour of a 'normal' coast returned.

[5] Walachia is a historical and geographical region of Romania. It is situated north of the Danube (present-day Serbia and Bulgaria) and south of the Southern Carpathians.

2.1.2 Sulina jetties

South of the expanding Kiliya Delta, humans heavily modified the mouth of the Sulina branch. The construction of the Sulina jetties in 1858 caused much of the negative aspects in the Delta, similar to the adverse effects now predicted for the Bystroe canal project. Large amounts of sediment for the coastal development in this middle part of the Delta were lost as they were sent out into the deeper parts of the Black Sea through the jetties, out of reach of the coastal current. Only the fact that this took place in a period of sediment abundance somewhat mitigated the effects on the Kiliya Delta and the coastline.

It is highly possible that the Kiliya Delta and the area north of Sulina will soon grow together, as Musura Bay has almost filled up with sediment. Downstream of the jetties, forces have started to erode the coast between Sulina and Sfantu Gheorghe.

2.1.3 Sfantu Gheorghe

In the last 100 years, the mouth of the Sf. Gheorghe branch behaved as it already had for thousands of years. It developed new sandbanks and islands south of the river branch, which were followed by new dunes to the north of the mouth. It is still in a very natural state.

2.1.4 Sediment hunger

Sediment that creates the outer Delta comes from the Danube river system. The Danube River and most of its tributaries upstream have been heavily dammed for irrigation, shipping and hydropower purposes. At these locations, the sediment input has already been stopped. In the Lower Danube (which is in a more natural state than the upper or middle Danube), a large supply of sand and silt is still available from the wide floodplain.

2.2 The inner Delta

2.2.1 The water system

Man has changed the inner Delta's natural water circulation system. Canals have been dug, and sediment flows have been cut off (or increased) in some places. In total, the sediment input to the inner Delta has increased, which has led to silting up of the western-most lakes near Canal Mila 35. The many polders constructed in the last century have also heavily impacted the water system.

The water system has been studied for many years by Romanian scientists, resulting in a series of recommendations for the restoration of a more natural water circulation by closing some canals, and opening others in places of older natural watercourses. On the Ukrainian side, limans[6] used to be connected to the Danube floodplain. During the intense period of embankment about 40 years ago, the limans were cut off from the river. Now, the concentration of salts in these lakes is so high that the water quality is inadequate for human consumption and irrigation. In addition, almost all fish species have disappeared.

The many canals cut through the inner Delta during the last two centuries have had a

[6] Liman is a name for a lake formed at the mouth of a river, blocked by a bar of sediments. Liman can be maritime (the bar is created by the stream of a sea) or fluvial (the bar is created by the flow of a bigger river at the confluence). The name is used for such features found along the western and northern coast of the Black Sea, as well as along the lower parts of Danube.

strong impact on the Delta. Sediment from the Danube River is brought through the canals to places in the lake systems were they could not enter before. This sediment builds new riverbanks along the canals and fills up the lakes, which changes the ecosystem considerably. If the Delta were in a stable situation, this extra sediment input would have a negative impact. In times of severe rising of the Black Sea level, a hypothesis could be formulated that this process, on the long term, may contribute to the survival of the Delta, although this should be investigated in more detail.

2.2.2 Embankments and polders

Many areas in the Delta have been cut off from the main Danube water system. In the Ukraine, almost 120,000 hectares (limans included) are cut off from freshwater sources and sediment input by embankments. In Romania, almost 130,000 hectares have been cut off from the freshwater hydrological system through the construction of polders and fishponds.

In most cases, these embankment initiatives (for agricultural and economic purposes) were not successful. Polders for agriculture were very fertile in the first years after embankment. However, soon after salinisation occurred, making the soil unusable for agriculture. In the Ukraine, as well as Romania, there is a growing consensus to remove these obstacles, and restore these areas to the natural systems they once belonged to.

Fishponds also proved to be ineffective and expensive in their exploitation due to salinisation. Most of them are abandoned at the moment, and wait for restoration.

Large-scale reed harvesting turned the reedbeds affected into beds of rushes, thus destroying the reed. After abandoning reed harvesting, the beds restored themselves spontaneously.

2.3 The lower Danube

2.3.1 Embankments

In the 60s and 70s, almost all of the Danube floodplain and the large islands downstream of Calarasi were embanked. The dikes are mostly situated very near to the river, leaving no retention space for flood volumes, and thus being susceptible to breaches and inundation. As the original floodplain (over 1000 km in length) was a maze of lakes, watercourses, marshes, islands, and river dunes, the loss of natural habitats caused by the near-total embankment of the floodplain was enormous.

Agriculture, however, did not flourish in these embanked areas as planned. Fishing activities, once very prosperous in the lower Danube, collapsed.

As for the sediment balance of the river, the dikes and dams prevented the lateral movement, i.e. meandering, of the river. Thus, much of the sand and silt supply from the floodplain was cut off from the river after embankment.

2.3.2 Hydraulic modification of the river

The Danube River and most of its tributaries upstream have been heavily dammed for irrigation, shipping and hydropower purposes. More details on modification of the river for shipping purposes are given below (see Chapter 2.6.1).

2.4 Human settlements in the Delta

The main settlements in the Delta are Vilkovo, Izmail and Reni (Ukraine) and Sulina, Sfantu Gheorghe, Crisan and Tulcea (Romania). The cities of importance (Tulcea, Braila and Galați) were built on the high grounds that border the Delta, in the north, the south, and the lower Danube floodplain in the west overlooking the Delta, with only waterway shipping installations near the Danube.

The Danube Delta is home to a rich mix of Ukrainian, Russian, Lipovan, Bulgarian, Moldavan, Turkish and Gagauz people scattered around the Delta in small villages, although only a limited number of inhabitants live there. In the Romanian part of the Delta, the population is estimated at between 12,000 and 16,000, depending on the definition of the area covered and residence status. The total population of the Ukrainian Danube Delta is difficult to estimate. The Ukrainian national census does not distinguish between the political boundaries of the rayons and the Delta. Ten years ago, the total population of the three rayons in the Delta region (Izmail, Reni and Kiliya – which includes areas outside of the Delta) was 250,000, but since then the population has been declining. The population of Vilkovo, one of the larger towns of the Ukrainian Delta, was 11,000 in the last census (2001). It can be estimated that there area few thousand inhabitants in the Ukrainian Delta not living in Vilkovo. There is a tendency to leave the area, in search of better economic perspectives outside the Delta.

Until now, there was almost no urban development in the Delta itself. 19th century Sulina never developed into a large harbour, and remained a small town of only a few thousands inhabitants. No marshland city like Amsterdam, Rotterdam or New Orleans developed. The villages in the Delta – Sf. Gheorghe, Sulina, Letea, S.A. Rosetti, Kiliya Veche, Vilkovo and some smaller ones, play a role in local trade and tourism.

It should be noted that practically no large industrial developments exist in the Delta itself, which is a very positive aspect in terms of maintaining the area's natural state. The trend of intense urban development outside of the Delta should continue.

2.4.1 Local transport

The isolated villages in the Delta have no, or very few, road connections to the world outside. The living conditions in the villages are still very simple. Transport by horse-drawn carriage is common; almost no cars or tractors are seen.

In the plans for the Romanian Delta, a new road to Letea is planned. Such infrastructure will very soon become a determinant for further developments. Local boat routes will run the risk of being discontinued, and cars and buses will enter the region. Once this infrastructure is there, there is no way back.

2.5 Local economic activities

2.5.1 Local livelihoods

Traditionally, fishing has been important for the local population. In Romania, fisheries are controlled by the local authorities of the Danube Delta Biosphere Reserve. In the past, fishponds have been constructed. However, these proved to be impractical, and are mostly abandoned.

Gathering of natural products of the Delta is still carried out, such as honey, herbs, reeds, wood, frogs and leeches. Fruits and vegetables are grown on a local scale. Milk and cheese are also produced and marketed for local use.

Riverbanks are often used by villagers for keeping cattle and horses. Many of the Delta's waterways have riverbanks (levees) along them formed by silt from the river branches. In the western part of the Delta, these riverbanks are high and dry. In the east, they become narrower and lower. Apart from the riverbanks, a few dry areas can be found along the Delta seaside on the highest parts of sandbank complexes and in the coastal dunes. In many cases, the density is low enough to allow for the growth of trees and shrubs. There is no tradition in meat production.

2.5.2 Tourism

Tourism is a quickly developing activity, although developments are somewhat haphazard and not clearly directed. The main target groups are nature lovers, birdwatchers, fisherman and hunters. Therefore, there are opportunities to develop good and sustainable initiatives for ecotourism.

Current tourism activities include bed & breakfast (B&B) accommodation, boat transport, and local guides. Regional entrepreneurs, who are able to provide plane-to-plane tours to the visitors, control most of these activities; they cooperate with local restaurants and B&B facilities. Local providers are not able to provide a "full circle" tour to visitors, and are more or less dependent on what the regional entrepreneurs ask them to do. Developing this level of tourism would be important for the local people.

Larger cruise ships also come to the Delta from upstream destinations. They make a short visit to one or two hotspots in the area. As this group of tourists are generally wealthy, it is important to the local communities where these ships stop and embark from.

2.6 Waterway Shipping

2.6.1 Shipping on the lower Danube

For centuries ships and towed/pushed convoys have used the wide and deep Danube River for waterway transport. In the past, river normalisation was never considered necessary on the lower Danube downstream of the Iron Gate dams. In the 19th century, the English engineer Hartley, who improved the Sulina entrance to the Danube, already wrote that the lower Danube poses no problems, except for the sandbanks around Cernavoda. Investigations as recent as 1994 and 1995 came to the same conclusion. Modern shipping has enough "room" on the lower Danube, except for the stretch between the Bala branch and Cernavoda (the entrance to the canal to Constanța).

However, in a EU report on the improvement of the Danube River as part of the Pan-European TEN-T Corridor VII[7], suddenly new standards have been cited, resulting in an apparent necessity to modify the river and build hydraulic structures at most of the shallow areas in the river. A "hypercorrect" and over-perfectionist way of applying such standards would lead to a river with huge overcapacity. In 2015, it is estimated that 25 million tons of goods will be transported on the lower Danube. 25 million tons a year means a few convoys a day. On the Rhine, 200 million tons were transported alone in 2005.

On the Danube, an overkill of an 800-meter wide and 2.5-meter deep channel is planned, with its depth guaranteed 100% of the time (all year). The Rhine has a 150 m wide

[7] The Trans European Transport Networks (TEN-T) Programme includes several projects staged by the European Commission to develop transport infrastructure throughout the European Union and its Accession countries. The Danube River is part of Corridor VII, which extends from the North Sea to the Black Sea via the Rhine-Main-Danube Canal and the Rhine River.

channel, and the minimum depth is often not reached in dry periods.

The threat of this shipping project to the environment is large, as it will impact the last large, free-flowing natural riverbed in Europe. As sediment flow to the Delta is interrupted by hydraulic works upstream, the Delta may subsequently “drown” by lack of sediment input and the expected rise of the Black Sea level.

2.6.2 Shipping in the Delta

The Danube Delta coast is not apt for harbours. A river mouth emptying into tide-less sea develops a shallow sandbank at the coastline. This prevents large ships from entering the river.

Already in the 19th century, the Kiliya Delta was regarded as hopelessly unfit for a harbour. Even at Sulina, an expensive trick (the jetties) was necessary to break the sandbar that closes off the river mouths to the Delta. The aim of opening and dredging the Sulina branch was to reach the important, grain-exporting harbour of Braila just upstream of the delta at the Lower Danube.

At this moment, the Sulina harbour is almost the only way to pass from the open sea directly to the Danube Delta. In Soviet times, there was a harbour development in the northern part of the Kiliya Delta through the Ochakov canal. This has been discontinued.

From the Ukraine, several large rivers flow into the Black Sea; in addition to the Danube these include the Don, the Dnjepr, the Dnjestr. The Ukraine sees the economic need to connect these rivers by river-sea-river transport within its own borders. Hence, they wish to have their own opening to the Danube Delta, like Romania does at Sulina. This would give the Ukraine access to the TEN-T Transport Corridor VII, which goes all the way up to Rotterdam.

In recent years, plans have been made to make a new Ukrainian canal through the Bystroe branch. These plans encountered much resistance, both from organisations in the Ukraine, as well as international governments and organisations.

3 A Vision for the Danube Delta

Large parts of the Delta are still in pristine condition. Still, the Delta's natural system has been altered in a negative way due to a number of activities and effects described in the previous chapter. Opportunities for restoring its "damaged" parts are very good; the Delta is open to restoration and the development of its sustainable use.

What can we expect to become of the Danube Delta if we choose to continue with these activities?

- Embankment of the floodplain for water management and industrial-scale fishing and agriculture
- Pollution, hydraulic engineering measures, industrialisation, agriculture, livestock, and urban settlements disrupt the fragile ecology of the delta
- Reduction in the Delta's natural filtering capacity due to embankments
- Change in the natural sediments scheme due to cut-off of sidearms and river branches
- Overgrazing by domesticated cattle and horses
- Land use change in tributaries
- Canalisation and dredging for shipping and harbour development

While the region has great economic potential, current development trends threaten its very essence – the Delta's unique ecological value.

We have a choice! The Vision outlined in the next sections offers recommendations on how to safeguard biodiversity in the Danube Delta whilst reaping socio-economic benefits for local people.

The Vision can be summarised as a Danube Delta where ecology and economy is managed in harmony.

3.1 Key elements of the Vision

The Vision looks to large-scale maintenance and restoration of key processes of the natural Delta system in order to provide new opportunities for socio-economic development, conservation and sustainable use of natural resources. (See Chapter 1.2 on key natural processes).

However, this does not mean going back in time. Although the analysis of the natural system and traditional economic uses need to refer to historical sources, this does not imply an attempt to return to a "carbon copy" of a previous natural or socio-economic system.

The Vision is direction to a more natural system commensurate with modern life, with an open eye for the future. In the Vision, a number of restoration opportunities or themes are identified.

3.1.1 The genius of the place

The specific processes and circumstances that characterise a location were named in the eighteenth-century England as the "Genius of the Place". In this philosophy, nature conservationists do not design carefully researched biotopes for plants and animals. The idea is that natural processes, in which the plants and animals have a shared evolution,

are given free play so that the related plants and animals will themselves create their respective roles. Biodiversity itself is not the objective of the planning described here, but the natural processes that form the bases of the creation and survival of biodiversity, i.e. biodiversity not as an objective, but as a result.

The genius of the Danube Delta is determined by:

- Climate
  - Cold winters, hot summers
  - More evaporation than precipitation
- River activity
  - Periodic floods
  - Periodic droughts
  - Erosion
  - Sedimentation
  - Seepage water from the river or hinterland
  - Drifting dunes
  - Water in all its forms: flowing, stagnant, tepid, cold, clear, muddy, deep, shallow, permanent, periodical
- Important biotic, landscape-shaping processes
  - Natural formation of forests
  - Growth and accumulation of reed
  - Natural grazing
- The scale and sheer immensity of the water and reed mosaic

3.1.2 From dormant to active

The following measures are proposed in the Vision:

- Re-establishment of the natural morphological system by re-connecting the floodplain and Delta islands to river branches, and by partially removing embankments and dikes. This will restore the most important natural processes in the area.
- Possible conversion of over-exploitive agricultural techniques to human use that is restricted to the gathering of plants, animals and materials within the limits, products and resources of the natural system.
- Re-establishment of natural grazing as a landscape-forming process.

3.1.3 Measures to take

Measures must be carefully designed and implemented with a view to the social and economic situation:

- Combination of restoration of the natural system with economic activities which, if implemented with care, do not harm each other but, on the contrary, give each other new openings such as for ecotourism and waterway shipping.
- Avoid construction of new dikes and new investments for the repair of existing ones if they do not protect objects that are strategically important for society and its well-being.

3.2 The outer Delta

Sediment vital to the survival for the outer Delta comes from the upstream Danube River system. The river and most of its tributaries upstream have been heavily dammed for

irrigation, shipping and hydropower purposes. If more river and hydraulic modifications are made upstream for these purposes, a sediment deficit will develop, and the river will compensate for this by taking sediment from its bottom; the river bottom will sink deeper. There will be a shortage of silt for the developing riverbanks in the Delta. At the seaside, sand is needed to maintain shore growth. If the shore does not grow, it will start to erode. In some of the Delta's deepest lakes were plaur dominates, some sediment is still needed to prevent the lakes from not becoming too deep. Otherwise, the danger exists that the plaur will break up and the lakes will become larger without these natural borders. This will unnaturally change the intricate hydrology of the entire Delta.

A shortage of sediment in the near future is a threat to the survival of the outer Delta on the long term.

RECOMMENDATIONS

As long as sediment input is guaranteed, the Black Sea shore of the Danube Delta will adjust to the rise or fall of the sea. If sediment input diminishes, the coast will start to erode.

The best thing for the outer Delta and the coastline is to promote a natural flux of sediment from 1) upstream in the lower Danube and its branches, and 2) from the sea itself.

3.3 The inner Delta

Past embankment and drainage initiatives to promote economic activities (agriculture, fish ponds, large-scale reed harvesting) have not been successful. **The very fact that these initiatives were not successful is the reason that large ecological restoration efforts are feasible.**

At this moment, large areas of polders and embanked levees, both in the Ukraine and Romania, remain unused. Restoring the underlying natural processes, e.g. by removing dikes, is a great opportunity.

RECOMMENDATIONS

For a sustainable future it is better to restore the natural ecosystem, and rely on the natural stocks of environmental resources, i.e. reed, fish and vegetation.

This can be achieved by restoration of the natural flow of water and sediment in the Delta through (partial or complete) removal of unnecessary embankments, as well as the re-connection of polders and limans to the freshwater regime of the river branches.

3.4 The lower Danube

The basis for the lower Danube's ecological value is the natural morphological processes in the river itself and along the floodplains. Restoration of floodplains would positively affect the morphological activity of the river, including the slow lateral displacements. It is important that these areas become available for lateral movement of the river. On the long-term, the sediment flow from the lower Danube floodplain is one of the main sources of sediment for the Danube Delta.

In June 2000, ministers from the governments of Bulgaria, Moldova, Romania and Ukraine signed the Lower Danube Green Corridor (LDGC) agreement. This agreement

declares effective protection for 1,000,000 ha of existing and new protected areas, restoration of 224,000 ha of natural floodplain, and promotion of sustainable use and development along the lower Danube. This is also very positive for habitat restoration and for flood prevention.

RECOMMENDATIONS

Free morphological development of the lower Danube should be ensured. This can be achieved through floodplain restoration and establishment of protected areas to prevent unsustainable industrial and urban development.

Embankments, lateral dams and groynes should be avoided, and existing embankments near the river should be removed over large distances, where possible (i.e. where human settlements will not be more prone to flooding).

On the long-term, sediment from these floodplains is vital for the survival of the Danube Delta.

This is the main aim of the Lower Danube Green Corridor (LDGC) agreement. LDGC initiatives should be supported and funded by governments and key stakeholders to ensure the environmental integrity of the lower Danube.

3.5 Natural grazing as a landscape-forming process

Low-density, natural grazing facilitates habitats for other animals and plants by developing an intricate maze in the vegetation zones of alluvial forests in the Delta. Both the willow-poplar-ash forest and the dryer oak-elm-lime forest type are represented in the Delta. Alluvial forests on the riverbanks, and the old oak forests of the islands along the seaside add considerably to the biodiversity of the Delta.

Feral herds still survive at two places in the Delta. In the outer Kiliya Delta (Ukraine), near the Bystroe mouth, a group of cattle thrives. The impact of their grazing, in the form of vegetation gradients, is clearly discernible in the landscape. In Letea Forest (Romania), natural family groups of horses live wild on the sandy islands in the middle of lakes and vast reedbeds.

Roe deer (*Capreolus capreolus*) and fallow deer (*Dama dama*) live in the Ukrainian part of the Delta. These species move throughout the landscape, and most likely, crossover to the Romanian Delta as well. Wild boars are abundant.

Without natural grazing, the forest would develop into relatively monotonous and dark areas. At places were low-density grazing is still active, an rich and intricate pattern of dark and light, moist and dry, open and closed, and high and low parts of landscape have developed. This differentiated pattern provides habitats for far more animals and plants than the closed forests without grazing.

Some of the animals, especially bird predators, require both marshlands and alluvial forests for survival. Cormorants make their colonies in the forest. White tailed eagles build their nests in the trees. In the Dutch case (oostvaardersplassen), the very fact that grasslands and large reed beds were located near to each other led to the return of the Greylag Goose, a species that needs both habitats.

Low density, small-scale grazing is still is found in parts of the Delta. These examples could serve as a good basis for the development of sustainable cultural/semi-natural cattle and horse husbandry. This could be especially helpful to deter the overgrazing visible in some parts of the Romanian Delta.

RECOMMENDATIONS

Both natural and cultural grazing, if properly managed and if overgrazing is avoided, could add to the biodiversity of the Delta, and to the economy of the local population.

In this perspective, a species that is already present in the cultural landscape for a very long time is suggested: the water buffalo. This species is raised widely in some parts of Romania and Bulgaria, and there is evidence of its former use in the Delta. Use of the water buffalo could add to the sources of income for the local population (milk products), and to the differentiation of habitats in the Delta through natural grazing.

The horses and cattle traditionally raised in the Delta also complement semi-natural/cultural grazing to develop and maintain riverine landscapes. By improving the marketing of these animals, a better income from this source could be gained, perhaps through meat production.

3.6 Ecotourism

Ecotourism is nature-based tourism that involves education and interpretation of the natural environment and is managed to be ecologically, socially and culturally sustainable. It offers big economic potential to the Delta and its inhabitants as an umbrella driver to generate income on local and regional levels.

In Western Europe and other western countries, protected areas generate income for local people by providing tourist services such as accommodation, local gastronomy and viticulture, guiding, and the sale of specific local products and souvenirs. The client base is usually dominated by domestic tourists, supported by a smaller number of foreign visitors. In the ex-communist countries the situation is different: incomes are generally lower for luxuries such as holidays; there is generally less fascination with the natural world; 'traditional' holidays such as beach/camping/sanatorium visits prevail; plus people who can afford holidays often choose exotic foreign locations which have only recently become accessible to them. We anticipate that in the future this situation will change, as salaries increase, environmental education and awareness becomes more widespread and as long-haul travel becomes more expensive. **The immediate challenge seems to be to attract foreign visitors by focusing on key target groups, whilst at the same time raising awareness and promoting nature tourism amongst the 'local' (includes regional) population.** The target groups should start with domestic tourists and specialised international tourists (birdwatchers, hunters and fishermen). Eventually, a wider public can be targeted.

It should be ensured that locals actually receive the benefits from ecotourism opportunities in their area. Locals interested in exploring ecotourism as a source of income need help on several levels:

- Information on the expected tourists: what do they come for and why
- Information about their own surrounding landscape: specific local information and stories to pass on to the tourists
- Basic knowledge of foreign languages to communicate with international visitors, e.g. English, German, Russian, Italian, French
- A good understanding of what domestic and foreign tourists expect in terms of service and accommodation
- Leaflets, brochures, maps and websites to promote their offers

For local communities it is difficult to compete on the regional market for ecotourism. Help is needed in organisation, funding, and sharing information. The existing regional plans in both the Ukraine and Romania provide schemes for education and small loan programs; this could be linked with local ecotourism initiatives.

For example, the regional tourist organisations, such as Salix and Pelikan (UA) and Ibis (RO), offer different ecotourism packages. For individual villagers it is difficult to compete with these offers, as the locals can only offer one part of the chain: transport, lodging, or food. An central organisation, such as a kind of common local tourist office, could at least make it possible for groups of villagers to offer closed trips, like 1) Tulcea-Sf. Gheorghe-Sulina-Letea-Kiliya Vecche-Tulcea, or 2) Izmail-Vilkovo-outer Delta.

Regional ecotourism has a different dimension than local tourism. Often, plane-to-plane service is offered to international tourists along with a whole chain of services: food and lodging, transport, destination information and guides. This makes it profitable for the firms offering these services. Although the regional firms may occasionally use facilities offered by local people, the villagers often see tourists just pass by.

On the Danube River, luxurious cruise ships bring wealthy international guests to the Delta. Visits arranged to small towns or villages could be economically profitable for the local population.

RECOMMENDATIONS

Delta residents that find their source of income in the natural qualities of the Delta, such as providing ecotourism services, will develop respect for the environment.

A more detailed tourism assessment needs to be done in order to identify the real business opportunities for locals, how they support conservation, and how they can be implemented or supported (also financially) in order to link up with regional ecotourism while still bringing economic benefits to the local villages.

Regional ecotourism firms cater to most of the market for ecotourism. In itself this is a good thing, as they run good programs. Still, benefits to local village people should be ensured.

Efforts are needed in awareness about forbidden areas, routes through the Delta - in other words general rules of conduct. The best way to achieve this is by mutual understanding and agreements.

3.7 Sustainable waterway shipping and harbour development

The Danube Delta is, and will continue to remain, and important region for waterway transport. It is on the transport route from the Black Sea to the North Sea via the Danube River, the Rhine-Main-Danube canal, and the Rhine River. This transport route has been designated as Transport Corridor VII by the EU under the Trans-European Networks for Transport (TEN-T) programme.

Waterway shipping navigation and harbour development in the Delta region does not need to be a threat to the Delta's natural system. In fact, many opportunities exist to bring economic benefits to the regional economies through transport activities. Waterway shipping just needs to be directed down a sustainable path, as opposed to the present trend, which threatens the Delta's ecology, biodiversity, and long-term survival.

For example, building a deep shipping canal or large harbour in the "wrong" place would not only damage the natural system, but would also direct ships to and through pristine

ecological areas, favouring industrial activities in the very heart of the Delta. The plans for a new entrance from the Black Sea to the Danube Delta at the Bystroe Canal are one example of this. Construction of Sulina harbour in the 19th century interrupted the north-south long distance current in the Black Sea, and brought sediment from the Danube River "out of reach" of this current. This caused much damage to the Delta, especially the fact that the coast started to erode downstream of Sulina, and still is eroding. This mistake should not be repeated in the Bystroe case, as applying the same measures to the coastline will damage the outer Delta further to the south.

For Bystroe, local Ukrainian experts have suggested several alternatives. Future cooperation with professional consultants from the Delta (Ukraine especially for the Bystroe issue) region and other European countries will be beneficial to find the most economically and environmental sound alternative. In fact, a group of experts has already started a discussion on possible solutions.

The location of the Constanța harbour far from the Delta-area with a canal as a shortcut from the Black Sea to the Danube is very beneficial for the Delta, as are the several harbours in the north Adriatic Sea with overland connections to the middle Danube.

A plan to "improve" the Lower Danube (about 1000 km!) for shipping poses the largest threat for the river at this moment. Not because shipping should not be desirable for the emerging economies of Ukraine, Moldova, Romania and Bulgaria, but because of the way the "improvement" is to be executed. A tremendous overkill in capacity and the use of 19th Century methods of "constricting" of the river through groynes and lateral dams would ruin the river's remaining ecological treasures, such as the Danube islands and some of the last spawning grounds of Danube sturgeon.

As long as large vessels use the lower Danube, the answer always has been to adapt the vessels to the circumstances of the river, and not vice versa. Even ships with a draught of 2.5 can be accommodated most of the year. Problems with draught occur less than on the river Rhine.

RECOMMENDATIONS

Adapt ships to the river, not the river to the ships! The Lower Danube is the last natural river in Europe, large and deep enough to carry all the forecasted shipping. Modern, low-draught ships and improved navigation methods (GPS and digital mapping ENC) make it possible to navigate easier and more efficiently on the natural river without unnecessary and permanent modification to the river itself.

Alternatives for a Ukrainian canal connection to the Danube River and harbour development outside of the immediate Delta area should be proposed. National and international experts are already discussing these issues and background studies have already started.

The north-south Black sea current should not be interrupted in order to safeguard the Delta's coastline. In addition, sediment from the Danube river branches should not be "wasted" by guiding them out deep into the Black Sea (a result of deep shipping canal construction), out of reach of the coastal current.

3.8 Quality of life for local people

A desirable future for the Danube Delta requires that the lower living standard in Delta villages be increased for the good of the local people. These improvements should be developed sustainably and a Delta-wide basis. Some regional and national programs

already exist that aim to improve the living conditions in the Delta, such as the Romanian Master Plan for the Danube Delta Region (see Chapter 4.1.1). Drinking water, sewage water treatment, electricity, and housing should be implemented or improved. This, of course, is a very good thing in itself.

It is important to improve the connections to the outer world. Major investments should be made in the Delta's infrastructure, but this does not necessarily have to be intense urban development. For example, existing water connections and routes should be explored instead of building roads. It is important to do this with good water transport services, especially in emergency cases. Comparable isolated villages around the world (e.g. on Danish, German and Dutch islands along the North Sea Coast) have found they do not like cars and tractors, and many of these communities decided to ban such vehicles from their islands.

In addition, traditional local architecture should be maintained to safeguard the Delta's unique history and aesthetics. Architectural and construction standards for future building projects should be developed and enforced.

RECOMMENDATIONS

Intense urban development should not take place in the Delta, e.g. improve existing transport connections by water instead of building roads.

Supporting a local population that is aware of the qualities of the Delta, and able to gain an acceptable standard of living out of it, is a basic condition for the long-term sustainability of the Delta.

4 Implementing the Vision

The Vision is a source of ideas and a call for cooperation. The ideas presented here can be integrated into development plans and can stimulate other organisations and initiatives to join the partnership with WWF to implement the Vision.

Some suggested priority actions to implement the vision include:

- Model sites
- Ecotourism development
- Promoting sustainable waterway transport
- Upstream management
- Coordinated transboundary management

They are discussed in further detail below.

In addition, although not covered in detail in this Vision, other unsustainable industrial activities should not be ignored. To be more exact, fisheries, reed harvesting and agriculture activities should be directed to complement the overall vision as much as possible. This keeps in line with a common sustainable idea, and avoids destruction of Delta natural processes on a whole.

4.1 Current management policies

Before we go into more detail about potential ways to implement the Vision, the following frameworks and activites affecting the Delta should be highlighted. All of these need to be considered in Vision implementation plans.

4.1.1 Romanian Master Plan, Danube Delta

The Master Plan for the Danube Delta in Romania, to run from 2007-2015, is funded by the Ministry of Environment. The Plan, designed by the Danube Delta National Institute in Tulcea, aims to support sustainable development, and includes five main objectives:

1. Improve the monitoring system for the DD ecosystems using satellite information.
2. Improving the infrastructure for public services, transport and communications aimed at reducing pollution, community isolation and to increase the living standard of the local people.
3. Support the development of alternative traditional activities in order to reduce the pressure concerning the fish resources.
4. Support the traditional use of natural resources and the rural landscape, promote the non-conventional sources of energy (windmills, solar energy, boats whit electric engines).
5. Ecological restoration of natural functions of the DD ecosystems and of the habitats of endangered species.

4.1.2 Ecological and Economical Rehabilitation Programme for the Danube Floodplain

This programme was approved by a decision of the Romanian Government in June 2006. It has three phases:

1. Development of a digital model for the reinforcement of dikes around villages

(December 2006)

2. Assessment of current use of polders along the Danube and an implementation plan for the ecological restoration of the floodplain (December 2007)
3. Implementation of the results (2008-2010)

4.1.3 Transboundary Biosphere Reserve

An international conference on the Conservation and Sustainable Development of the Danube Delta took place in Odessa, Ukraine, in February 2006 under the aegis of UNESCO and ICPDR. One of the conference's conclusions was that a shared vision for the future of Danube Delta must be developed in accordance with international conventions, agreements and programmes. Following the conference, a commitment was made by the three Danube countries to set the Delta on a sustainable development course.

In addition, the plan is now underway to develop a new Biosphere Reserve covering the entire delta management by a single joint transboundary management authority. WWF pledged to help support and drive the process towards a sustainable management plan for the Delta. This commitment from the three Delta countries has already led to the formulation of significant restoration plans in Romania, and led to greater cooperation between the management authorities from all three countries. For the first time, each government is now committing new local funds to develop transboundary activities.

With the creation of the transboundary biosphere reserve, it is hoped that synergy effects will help to resolve the shared socio-economic problems and, at the same time, help to maintain the delta's ecological processes and biodiversity.

4.1.4 Danube River Basin Management Plan

The Danube River Basin Management Plan follows the deadlines set out in the EU Water Framework Directive (WFD). The achievement of good water status in the water bodies of the Danube region by 2015 is coordinated by the ICPDR. As a coordinating body, the development of a comprehensive management plan for the entire Danube river basin is based on the principles of the WFD. The process involves experts from industry and agriculture, and representatives from environmental and consumer organisations as well as the local and national authorities. The Danube River Management Plan is to be updated every six years according to EU legislation. The Bulgarian and Romanian accession to the European Union will imply the adoption to environmental policies and standards. The WFD requires water management on a basin-wide scale, thus setting the scene for international and cross-boundary implementation of water regulation.

4.1.5 Regional Development Programme for Ukrainian Danube Region

This plan includes social, economic and environmental programmes for the three rayons along the Danube River (Reni, Izmail, and Kiliya). It was officially endorsed by the prime minister in 2004, and will run until 2010. Several ministries contributed to the plan.

4.1.6 LDGC (Lower Danube Green Corridor) Agreement

The LDGC Agreement was signed by ministers from Bulgaria, Moldova, Romania and Ukraine in June 2000, declaring a protected area system along the Lower Danube, including the Danube Delta. It is the largest wetland protection initiative in Europe. The initiative seeks to connect existing protected areas with new protected areas, and to restore floodplains.

4.2 Model sites: learning and communicating

Model sites are an extremely cost-efficient method for supporting and catalysing the implementation of visions. Work at selected model sites will take the first steps in implementation of this Vision.

The main intent of model sites is NOT just implement restoration works. Rather, the goal of model sites is to make a "win-win" combination with the knowledge and experience that is locally available along with the international experience of WWF.

Model sites should illustrate, in the field, how the Vision can be implemented in practice, as well as show the benefits to local communities, economies, and the environment. Model sites provide experiences and ideas to be illustrated and shared. In model sites, learning from reality is essential to change theoretical views into sound practice. Making errors is normal, even essential; learning from mistakes ultimately helps lead to success.

Through model sites, other can be inspired to take the Vision forward. In fact, a range of strategic partners should implement the model sites together. This will require professional communication about the work and lessons learned to generate enthusiasm and knowledge amongst a wide audience in Romania, Ukraine and elsewhere.

Model sites should include the following elements:

4.2.1 Demonstration of the Vision

A model site should illustrate, in the field, how the Vision – or essential parts of it – can be implemented in practice. Therefore the model site should be of direct relevance to the recommendations, approaches and perspectives outlined in the Vision.

The model site should always be presented as a small-scale practical demonstration of the Vision. The link between model site and Vision should be as accurate as possible and easy to explain. Because the 'genius of place' varies across a large region, such as the Danube Delta, several model sites are needed, each demonstrating how the Vision can be put into practice in different ecological and social settings.

The aim is not to implement the Vision through the model sites themselves, but to inspire others to pick up similar activities so that the combined efforts of a range of actors, with their own projects and funding, eventually achieve full implementation.

4.2.2 Strategic partnerships and role of WWF

Since working with strategic partners is a key element in implementing the Vision, model projects should from the beginning include cooperation (and in many cases, co-design at the early stages) with one or more strategic partners. Since a country's development path is not determined by conservation organisations, strategic partnerships should involve other social and economic interests.

It should be stressed that WWF will not implement model sites wholly on its own. Instead WWF aims to help partners by providing knowledge, facilitating processes, and integrating international perspectives. WWF's role is temporary and aimed at magnification of the model site to the entire Delta.

4.2.3 Communication

Communicating the Vision and its (partial) implementation in model sites is essential to generate the necessary enthusiasm and follow-up. Communication should target audiences including people of all ages working and living in the Danube Delta, key local and regional stakeholders, including high-level politicians on a national level.

The purpose is to inspire and invite others to join in the Vision's implementation. Communication should therefore give full credit to the strategic partners involved and should be inviting and stimulating. It should take place in the field where the activities are taking place.

4.2.4 Quick start/modular design

Activities in the field could start as soon as the Vision has been published and accepted by the present partners. Communicating a Vision can only be done effectively if reference can be made to model sites in the field where WWF in cooperation with other parties is working to implement it. Without field activities, the Vision will soon lose its relevance for the people in Romania and Ukraine.

As full funding may not be available right from the start, a model site and its budget may be designed in a modular way, that is, specific activities within an overall project can be identified. As soon as funding for a given module is available field activities can begin. As additional funding becomes available, other modules can easily be activated as well.

4.2.5 Learning by doing

The Vision does not explain in detail how each of the model sites has to be developed, thus joint design of a model site together with the partners is an important step towards implementation.

The development and design phase is by and large a matter of experiment, whereby the partners together with WWF and/or other parties, develop and decide between options and measures. These may be modified later as a result of experience in the course of implementation.

Whereas this Vision document provides general guidance, the implementation plans should aim at maintenance or restoration of the Delta's natural processes supported by sustainable economic use, and should demonstrate how to achieve this. In other words, the Vision suggests the 'what' for a particular site while the partners together with WWF look at the 'how' to achieve it on a 'learning by doing' basis. Experience elsewhere has shown that 'learning by doing' is more effective for restoration projects than developing theoretical scenarios to guide implementation in the field.

4.3 Criteria for selection of model sites

This document suggests some possible model sites based on the following criteria.

- **Current use**: e.g. the sites are agricultural polders, with low productivity, not cultivated on their entire surface.
- **Restoration potential**: the integration of the sites in the natural system will contribute to restoration of the Delta's key processes and will support biodiversity; they have also high potential to be rapidly colonized by species of flora and fauna from the adjacent areas.
- **Location**: the sites are located in strategic located in the most accessible, visible and potentially biodiverse areas of the Delta.
- **Overall feasibility and cost effectiveness**: an implementation plan needs to be developed for each site in order to identify the best restoration solutions/alternatives, however, based on the information that already exists, the restoration of the proposed areas is feasible and does not imply intangible costs or insurmountable risks.

- **Socio-economic benefits**: local communities will benefit directly from the implementation of the model sites particularly related to ownership, employment in restoration activities and benefits from restoration i.e. increase fishing opportunities.
- **Local/national acceptance**: Some model sites have already received local acceptance, e.g. restoration works at Sireasa in Romania and Ermakov Island in the Ukraine. In addition, all Romanian model sites have been included in the national plans and programmes for the Danube Delta.
- **Co-financing**: either the sites have the potential for co-financing, or in the case of the Romanian sites, commitment from government to allocate funds for such works already exists.
- **Size**: The larger they are restored the better. Larger sites are better than smaller.
- **Time taken to restore**: It is important to show results within the lifetime of the project, and therefore those sites that offer restoration results and successes as soon as possible are preferable.
- **Contribution to flood mitigation**: As flooding is a particularly critical issue both to local people and also at the national level, restoration activities that show significant flood mitigation aspects should be selected.
- **Control of unsustainable developments**: Sites and restoration activities that will avert a significant imminent threat (such as planned destructive investments) will have a high preference for selection.
- **Level of innovation**: Restoration activities that demonstrate a significantly innovative and novel solution will add critical value to the restoration activities. Of particular interest are sites or activities that empower local communities to improve their own governance and benefit sharing from the results of the restoration.
- **Integration with existing policies**: In the Ukraine, a regional development plan has been formulated by the government. In Romania, the Management Plan of the Danube Delta Biosphere Reserve plays a similar role. The model sites should fit into this context.

4.4 Past experience: successful model site implementation in Ukraine

In 2002, a Vision for Ukrainian Danube Delta was published by WWF and supported by the key stakeholders in Ukraine. Publication of the Vision was followed by the launch of the first model floodplain restoration project on Tataru Island. Together with the local partner, Izmail State Forestry, the project was successfully completed.

Strategic partnership with the Odessa Water Management Board (WMB) built through the Ukrainian Vision development process led to formulation of an additional model site at Katlabuh Lake – one of the largest limans in Ukrainian Danube Delta. This project was the first large step towards large-scale floodplain restoration by removal of the section of the river dykes in order to restore natural, regular flooding, (vertical) growth of the Delta, filtering of sediments and nutrients, refreshment of the water in the limans, and spawning places of indigenous fish species.

Development of the partnership with the WMB raised more then 50% of funds in Ukraine for the implementation of the Katlabuh project. Following this successful example, further efforts were undertaken to strengthen cooperation with the governmental agencies in Odessa. These efforts resulted in establishment of a Task Force by the Governor of

Odessa Oblast for cooperation with WWF.

Ecotourism initiatives and introduction of natural grazing were also successfully started in two project areas on Tataru Island.

Now, the next steps involve efforts to intensify Task Force dialogue, to further explore funding opportunities in Ukraine, and to formulate a floodplain restoration action program for the Ukrainian Danube Delta. The list of potential model sites in this document is based on further cooperation with strategic partners in the Ukraine and their commitment to co-fund implementation of floodplain restoration projects.

4.5 Model sites: Ukraine

Four potential models sites for the Ukraine are discussed in this section. Other model sites are possible. The model sites listed in this document are examples, not the final list of the possible model sites.

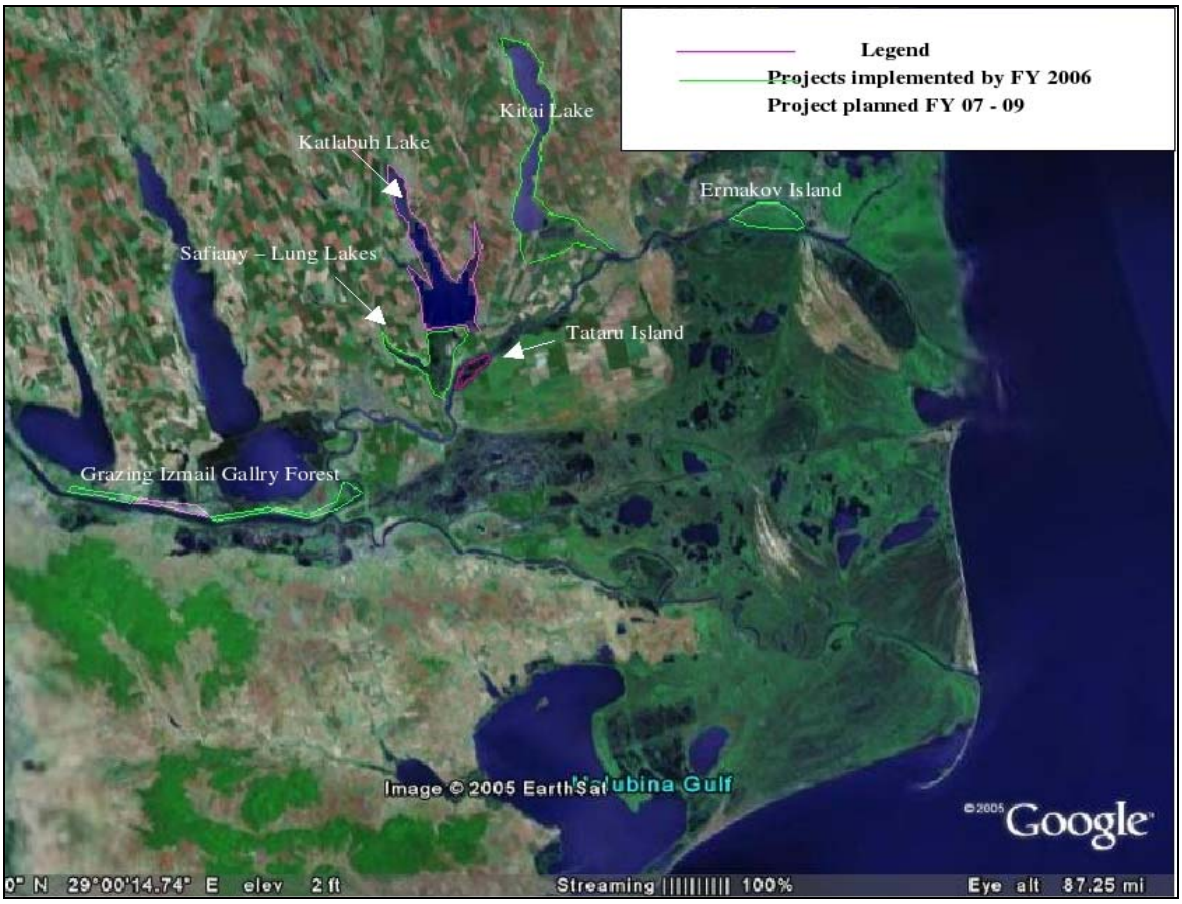

Figure 4: Potential model sites in the Ukraine.

Four new activities are suggested here, to be started over the next three years with the aim to further explore funding opportunity with key partners and to integrate Vision principles into regional policies.

4.5.1 Safiany-Lung lake system

Total area: 5,000 ha

Site description: The Safiany-Lung lake system forms an extensive mosaic of reed beds southwest of Katlabuh Lake. It used to be part of the Katlabuh system until the 1960s, when Katlabuh Lake was embanked and cut-off by a dam. Reedbeds are the most valuable part of the system in terms of biodiversity. Lung Lake, an open water area in these reed beds, is a protected area of local importance.

Possible works: Natural flooding and water flow through the system is needed for restoration. This can be accomplished by removing the dam that separates the Safiany-Lung lake system from Katlabuh. This will allow the reedbeds to be returned to the Katlabuh system.

Canals also regulate the natural flow from the west; the canals could be modified to improve the water regime. Canals delivering water to the east should also be modified as much as possible to mimic the natural channels that once existed there, which were cut-off by the road from Izmail to Vilkovo.

This model site, along with the ongoing Katlabuh project, could become an excellent example for large-scale lake restoration, including restoration of filtering functions of natural reed beds.

Moreover, the project could significantly contribute to restoring the natural spawning areas of Katlabuh Lake, where fishery is a main activity.

Thus restoration of this system is a next phase of the restoration of a former Katlabuh system that was started in 2006 in cooperation with the Odessa WMB.

Kay partners: Odessa WMB, Katlabuh Agriculture & Fishery Company, local communities

Key natural processes affected: Flooding

Erosion and sedimentation

Natural succession of the vegetation

Figure 5: Restoration of Katlabuh Lake (left) is an existing model site. The smaller, neighbouring Safiany-Lung Lakes (right) are proposed as new model sites.

4.5.2 Ermakov Island

Total area: 2,500 ha

Site description: Ermakov is the largest island of the inner delta on the Ukrainian side. It is probably the result of several smaller islands that have grown together. The island used to have large reed bed in the interior, but this has suffered from salinisation and overgrazing of domestic livestock. In fact, some locations the freshwater vegetation has completely disappeared in favour of saltwater vegetation that cannot be grazed by livestock. Dikes surround the island.

Possible works: To restore the island to a natural floodplain, the unhampered processes of sedimentation and erosion must be allowed. This will be achieved by removal of dikes.

For the survival of the animals on the island in times of flood, part of the existing dikes could be locally enlarged to form artificial mounds. These mounds can be used for survival of the herds, and to accommodate ecotourism facilities, and as an example of construction of safe areas.

Restoration plans are being developed now, and will be carried out with the private company that owns this site.

Documents necessary for implementation of the model site will need to be identified. As Ermakov Island is a part of the Danube Delta Biosphere Reserve, some additional studies need to be developed, i.e. environmental impact assessment. All these documents will be produced and endorsed by all relevant authorities, including the Ministry for Environment and the National Academy of Sciences.

Income from sources other than agriculture could be a realistic

	possibility for the island's owner: ecotourism, meat and skins from animals as part of herd management, sustainable reed harvesting, and gathering of natural products.
Key partners:	Owners of island, the Danube Delta Biosphere Reserve (Ukraine), Odessa Water Management Board
Key natural processes affected:	Erosion and sedimentation Flooding Natural succession of the vegetation Grazing Salts and desalinisation of the floodplain

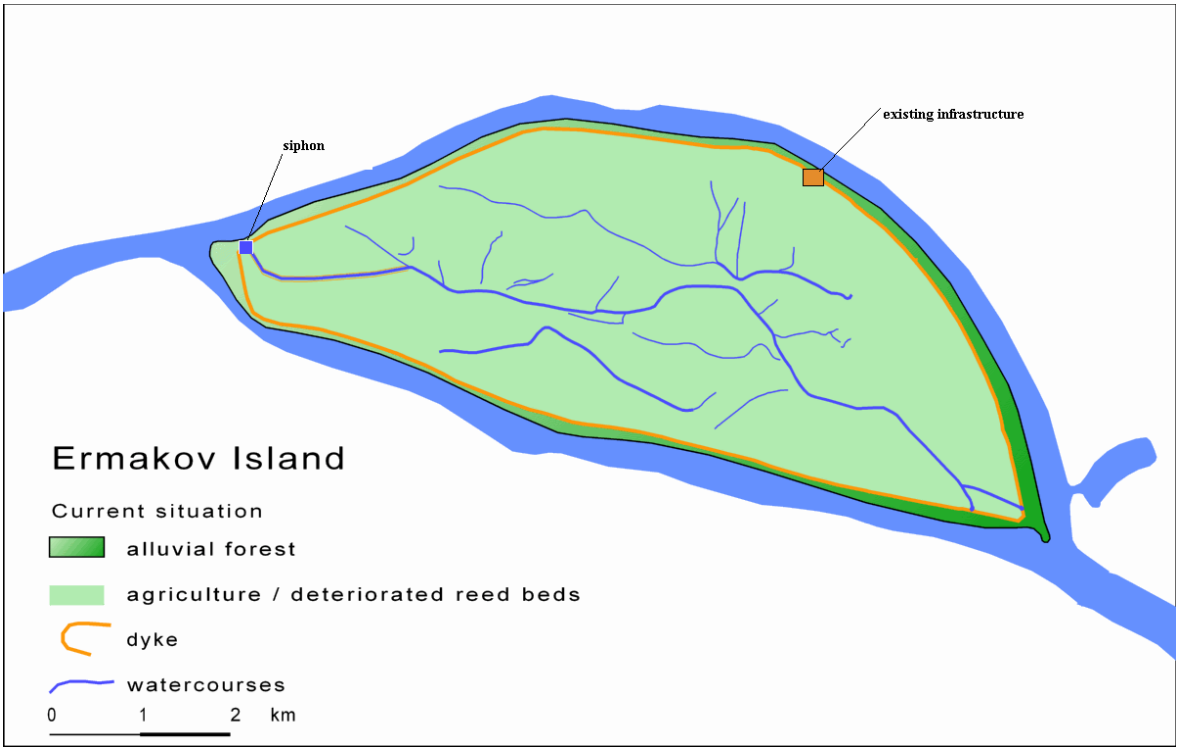

Figure 6: Current state of Ermakov Island

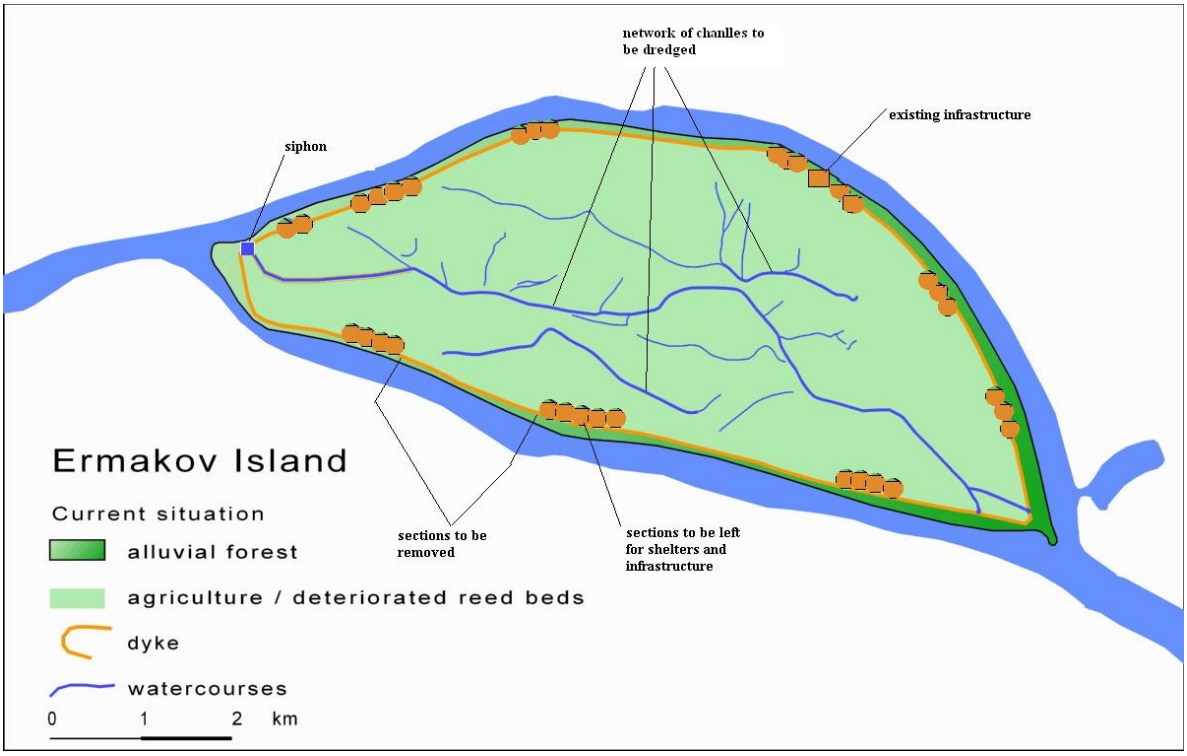

Figure 7: Ermakov Island after proposed restoration

4.5.3 Natural Grazing: Ermakov Island and Izmail Forest

Description:	Introduction of natural grazing to restore key landscape forming processes has already started successfully on Tataru Island. Natural grazing will be expanded to include Izmail Forest and Ermakov Island. On Ermakov Island, for the survival of the animals in times of flooding, part of the existing dikes could locally be enlarged to form artificial mounds. These mounds can be used for survival of the herds, and to accommodate ecotourism facilities, and as an example of the construction of safe areas in the floodplain.
Key partners:	Izmail Forestry, private owners of Ermakov Island
Key natural processes affected:	Vegetation succession Grazing

Figure 8: Natural grazing of cattle on Tataru Island (photo: Renee Meissner)

4.6 Model sites: Romania

In Romania, promotion of the Vision is just starting, and potential partners are being approached. Three potential models sites for Romania are discussed in this section. Other model sites are possible; the model sites listed here are examples, but not the final list of the possible model sites.

Figure 9: Potential model sites in Romania

4.6.1 Sfantu Gheorghe branch

One of the following two model sites along the Sf. Gheorghe branch may be explored pending feasibility:

- Carasuhat
- Murighiol

Carasuhat

Total area: 2,863 ha agricultural polder (1,209 ha administrated by the Local Council; 1,654 ha administrated by the County Council)

220 ha – fish polder (administrated by the County Council)

Site description: Carasuhat polder is situated north of the Sf. Gheorghe branch. The site was embanked between 1961 and 1989, being transformed from an

area with wetlands, pastures and lakes to arable land and fishponds.

The local communities of Baltenii de Jos and Baltenii de Sus support the restoration of the agricultural polder.

The area is currently used as arable land and pastures. Implementation of the model site will bring new opportunities for economic development through small-scale fishing, reed harvesting, and possible links to ecotourism.

Possible works: To restore the island to a natural floodplain, the unhampered processes of sedimentation and erosion must be allowed. This will be achieved by removal of long stretches of dikes and re-connecting the polder to the natural system.

Potential key partners: Danube Delta Biosphere Reserve Authority, Danube Delta National Institute, Tulcea County Council, local authorities (villages within Danube Delta), National Institute for Land Reclamation, Romanian Water Authority, Ministry of Environment and Water Management

Key natural processes affected:
Erosion and sedimentation
Flooding
Natural succession of the vegetation
Salts and desalinisation of the floodplain

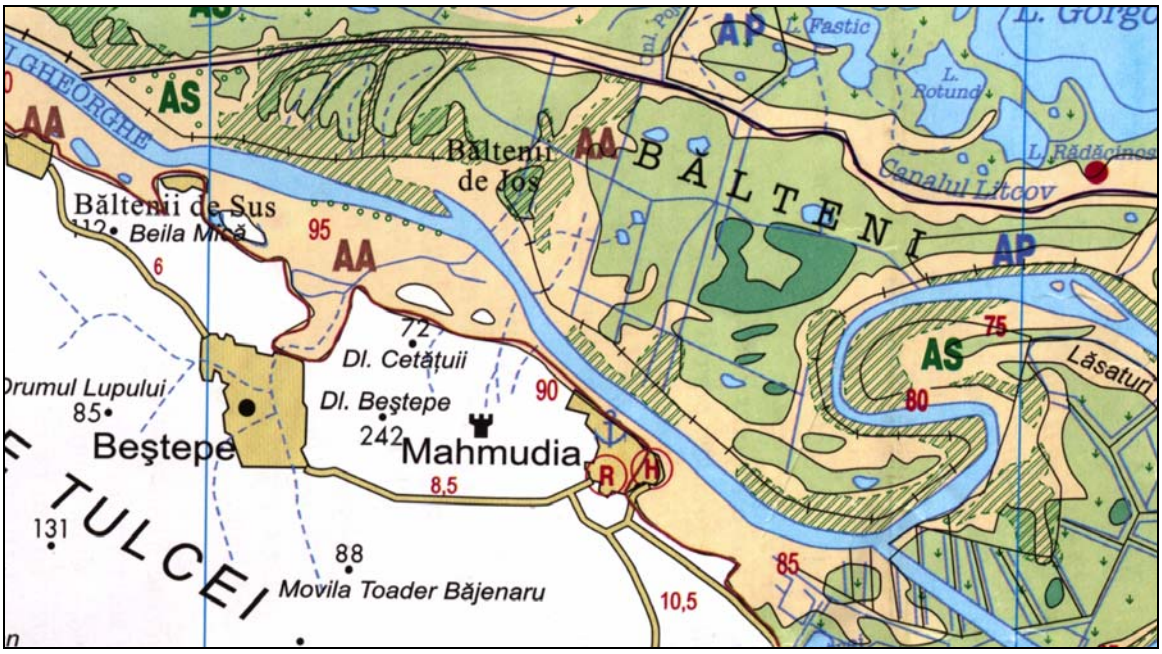

Figure 10: Carasuhat polder (by the Balteni area on the map)

Murighiol

Total area:	2,538 ha agricultural polder (201 ha administrated by the Local Council; 2,337 ha administrated by the County Council)
Site description:	The Murighiol-Dunavat polder is situated south of the Sf. Gheorghe branch. The site was embanked between 1961 and 1989, being transformed from an area with wetlands, pastures and lakes to arable land and fishponds. The current land use is arable land (1,503 ha), pastures (419 ha), and reedbeds (616 ha). The arable land is subject to concession.
Possible works:	To restore the island to a natural floodplain, the unhampered processes of sedimentation and erosion must be allowed. This will be achieved by removal of long stretches of dikes and re-connecting the polder to the natural system. In addition, restoration of the connection with the Sf. Gheorghe branch and improving water circulation in the Lipovenilor channel is foreseen, as well as protection of the village of Murighiol against flooding by circular dikes.
Potential key partners:	Danube Delta Biosphere Reserve Authority, Danube Delta National Institute, Tulcea County Council, local authorities (villages within Danube Delta), National Institute for Land Reclamation, Romanian Water Authority, Ministry of Environment and Water Management
Key natural processes affected:	Erosion and sedimentation Flooding Natural succession of the vegetation Salts and desalinisation of the floodplain

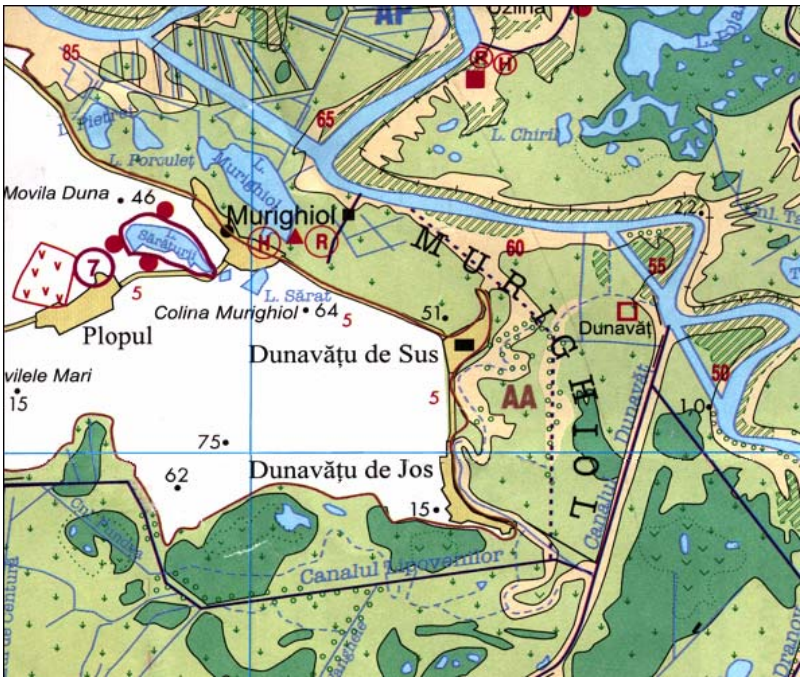

Figure 11: Murighiol polder

4.6.2 Sireasa

Total area:	Agricultural polder of 5,480 ha surrounded by a dike of 42 km (910 ha administrated by the Local Council, 4,570 ha administrated by the County Council)
Site description:	Sireasa is situated at the bifurcation of the Kiliya and Tulcea branches (at the border between Ukraine and Romania, hence the transboundary importance). Sireasa has large and wide riverbanks due to its position at the bifurcation point. The Ukrainian Izmail Gallery Forest project is just opposite Sireasa, thus enabling a model site on both sides of the Kiliya branch. There are three villages located in the polder area: Ceatalchioi (375 inhabitants), Salceni (77 inhabitants) and Plauru (96 inhabitants). In May 2006, the protection dike was consolidated to protect the Ceatalchioi village (during the 2006 floods, the dike was eroded along 1 km, between km 110 and 111). Due to frequent flooding in the area, the building and consolidation of protection dikes around the villages must be taken into consideration. The current land use is arable land (4,867 ha), pastures (46 ha), and reed beds (567 ha). The County Council gave the arable land by concession to the Agrodelta Sireasa Company. In 2005, the company did not use the land for agriculture or other purposes. The reedbeds are now extending, and the land is inappropriate for agriculture.
Possible works:	Restoration of former floodplains, i.e. restoring connection branches by removing long stretches of dikes. Introduction of a new concept of circular dykes around the villages for flood protection.
Potential key partners:	Danube Delta Biosphere Reserve Authority, Danube Delta National Institute, Tulcea County Council, local authorities (villages within Danube Delta), National Institute for Land Reclamation, Romanian Water Authority, Ministry of Environment and Water Management
Key natural processes affected:	Erosion and sedimentation Flooding Natural succession of the vegetation Salts and desalinisation of the floodplain Grazing

Figure 12: Sireasa polder

4.6.3 Natural grazing in Letea Forest

Site description: Overgrazing is visible in some parts of the Romanian Delta. In the Letea Forest Reserve, feral horses have already formed natural family groups in a “restricted area” managed by the state forest service. As there is a need to decrease the number of animals due to overgrazing, this is an opportunity to collaborate in management of the area.

In the villages, horse and cattle culture is still present. The aim is to establish a form of semi-natural grazing, while at the same time bringing economic benefits to the local population through the sale of (organic) meat.

Possible works:

- Possible removal of fences
- Adjust herd populations to natural density levels
- Vaccination of animals against diseases
- Development of a business plan for economic use of the grazing project
- Link with ecotourism initiatives, e.g. replacement of birdwatching

towers, horse riding tours

Key partners:	Local authorities and villagers, local ecotourism operators
Key natural processes affected:	Vegetation succession Grazing

Figure 13: Horses grazing in Letea Forest (left, photo: Geert Overmars). A shepherd with cattle along the Sf. Gheorghe branch (right, photo: Renee Meissner).

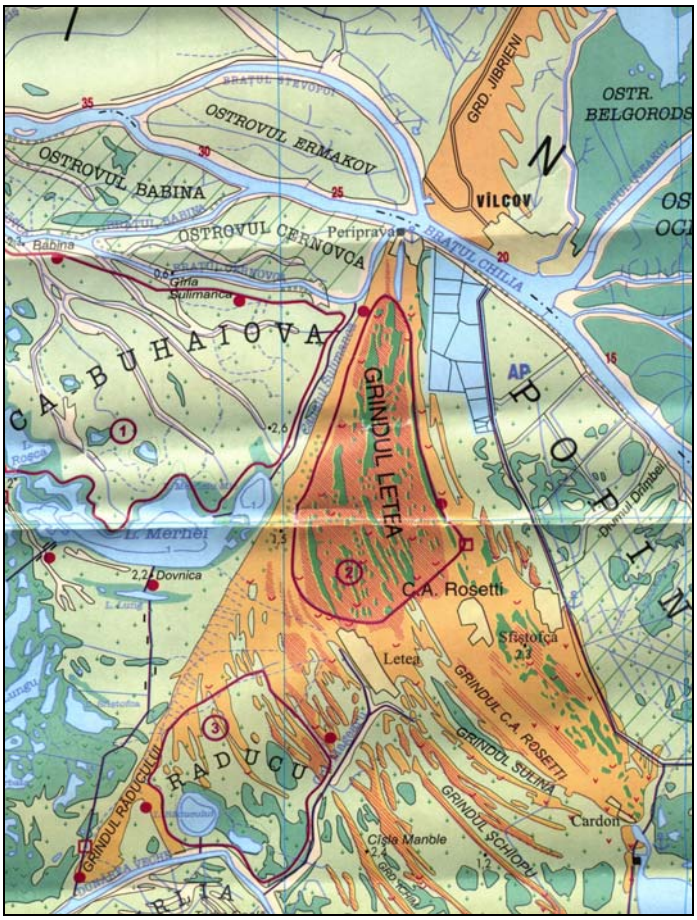

Figure 14: The Grindul Letea restricted nature area

4.7 Ecotourism

In order to promote and implement ecotourism initiatives, four main activities are proposed, in addition to a continuation of ecotourism activities that already started in the Ukraine in 2005.

Activity 1: **Strategy for ecotourism in the Danube Delta**

Tourism activities increased in the last years in the Danube Delta and are developing rapidly. Infrastructure (hotels, pensions, guesthouses, type of boats, etc.) does not always follow the principles of sustainability due to a weak regulatory framework and have even become a serious threat in recent years.

A detailed tourism strategy should be developed for the entire Delta, which includes a tourism zoning plan, assessment of economic potentials and business opportunities, aspects of sustainability, and codes of conduct, to name a few. Also, the question needs to be addressed how tourism can directly contribute to conservation e.g. the management of the Biosphere Reserve core zones and buffer zones. The strategy needs to be developed in close cooperation with the local key stakeholders in Romania and Ukraine.

Activity 2: **Establish partnerships with local business partners**

Partnership with a local tour partner (possibly Ibis Tours) in Romania will be explored in order to set up a “model lodge” accommodation. A design phase, business plan, implementation phase and marketing strategy would be needed.

In the Ukraine, ecotourism cooperation has already been established with Pelikan Tours and local forestry authorities. This activity will undertake further actions to support ecotourism development in Ukrainian Danube Delta, in particular on Tataru Island (huts have already been built there), and Ermakov Island (a possible new ecotourism destination at the model site).

Activity 3: **Establishment of community-based tourism linked to model sites**

Partnerships with local communities or municipalities should be explored to develop community-based tourism linked to the selected model sites. This is crucial to create incentives for those communities to support floodplain restoration and sustainable use of the restored areas.

This goes along with empowerment of these communities towards fighting unsustainable developments that come from outside investors, This implies that local communities should have a stake, or even a final say, in any developments taking place in their restoration area (community rights) by setting up formal conservancies and developing sustainable management plans. The possibilities for such an innovative set-up will be explored; lessons may be learnt from other countries where this has been developed successfully.

The role of community empowerment and its link to tourism will be explored as a critical sustainable financing mechanism for the

restoration and management of the Delta.

Income-generating activities could include home stays, horse riding, and guiding.

Activity 4: **Tour Guide**

Support of production of a tour guide, such as from the Crossbill Guide series, will be explored to promote nature-based tourism. Such a guide should include interesting information about the region's ecology, what tourists can see, where to stay, etc – all in line with how to support (or not deter) sustainable efforts of the Delta.

Potential key partners: Pelikan Tours (UA), IBIS Tours (RO), private owners of Ermakov Island, Izmail State Forestry

4.8 Sustainable waterway transport

4.8.1 Harbour and canal development in the Ukraine

The element of this part of the Vision is to develop and propose alternatives for canal and harbour development in the Ukrainian Danube Delta (outside the actual delta plain) that do not cause adverse ecological effects on the environment. This process already started in 2006; contacts and some initial ideas have already been exchanged. This needs to be expanded to bring in more local Delta experts and key stakeholders.

Activity: A list of feasibly and well-justified alternatives for canal and harbour development on Ukrainian territory will be developed. These alternatives will be promoted to the Ukrainian authorities and key stakeholders.

Two main questions can be identified:

1. What is the best location for a Danube-Black Sea connection, and how would such a canal/harbour function?
2. Is there a way to let the sediment in the north-south Black Sea current pass the Sulina jetties to bring these sediments to the southern part of the coast?

Potential key partners: A group of international experts from the Harbour Authorities of Rotterdam and Amsterdam, and from private consultancies could offer advice regarding these questions, with the necessary input and cooperation from in Romania and Ukraine.

4.8.2 Shipping on the lower Danube

As explained earlier in this document, due to the trends in transport development, navigation is one of the major threats to the ecological integrity of the Lower Danube and the Danube Delta. The main aim here is to provide good shipping possibilities while maintaining and even improving the natural behaviour of the last, and biggest natural river in Europe.

Activity: Formulation of alternatives for sustainable navigation will also be highlighted. Some of this information may come from a current WWF

project on sustainable Danube navigation[8] (work is ongoing since 2005 and will be intensified in the next two years).

Activities will be focused on promoting the cooperation of experts from sustainable shipping industries, to develop a sustainable navigation plan for the Lower Danube, and to promote these alternatives to the relevant authorities. This will also contribute to ensuring that navigation plans upstream along the Lower Danube maintain the natural processes of the river, so critical for the Delta itself.

[8] For more information, download the following WWF Position Paper: http://assets.panda.org/downloads/final_naiades_position_paper_070706doc_1.pdf

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