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STUDY REGARDING TO AGGRESSIONS ON THE ECOSYSTEM DANUBE DELTA – BLACK SEA AND PROTECTIVE MEASURES

Case study

Keywords

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Abstract

Danube Delta has suffered damages of habitat and species loss caused by factors, including: construction of dams upstream have degraded obviously flooding regime; creation of agricultural and fishing enclosures which decreased the natural and original surfaces; extending artificial navigation channels that negatively affected the hydrological regime and water quality of lakes; increase of nutrients in the water, industrial pollution and accumulate effluents that led to the reduction of plant and bird species; attempt to exploit quartz sand, very pure and fine, the sea levees, although they were protected as nature reserves because of the specific morphology and sub-Mediterranean vegetation covering them; tourism and illegal fishing; mismanagement of resources of reed and fish.

The fact is that there was a slight improvement for the marine ecosystem, reported since the early 90s. At present, the area of the Danube Delta - Black Sea is developing sustainable, in terms of medium and economic perspective.

In my study I used comparative methods, investigations, direct observations, measurements, calculations and actual data, obtained from surveys and direct observations, from prestigious, specialized and authorized institutions.

1. Introduction

After crossing a road, more of 2860 km, capturing a giant water catchment area which covers more than 8% of Europe, the Danube, the second longest river in Europe, it builds the confluence with the Black Sea, over ten thousand years, one of the most beautiful deltas in the world.

It is known that Danube Delta is the largest delta in northern temperate zone, with an area of 600,000 ha, including Razim-Sinoe lagoon complex (Alexandrov. et al., 2004). To observe the evolution and development of its extension, we may be aware that, during 1830-1979, Chilia delta area, for example, has increased considerably, with a significant increase in marine coastal perimeter, in length (Bondar, 2004); Bondar & Toader, 2001), from 30, at 80 km.

Currently, it is the largest area of reed, the most important migratory refuge of bird in Europe, the most complex set of ecosystems. It can be said that the impressive diversity of habitats and life forms that hosts a relatively small space, the Danube Delta is a veritable museum of biodiversity, a natural gene bank with invaluable natural heritage universal. It is recognized by experts as one of the last wilderness areas of our continent (Dobrogea Black Sea Coast, Tourist Guide, 2004) and the inhabitants of a particular lifestyle.

2. Economic and ecological forms of aggression

In support of our point of view, we started from the idea that people do not always take into account the unfavourable aspects of the past, which could be anytime examples that need not be repeated. It seems that only in times of crisis are sought, really, necessary informations. .

There are three elements that can become valuable information and should be taken into account: power, time and relevance. The last two items are not to be neglected, although gaps occur commonly, by ignoring their importance.

Economic and ecological forms of aggression committed until recently, on the Danube Delta have endangered the Delta's ecosystem, with disastrous consequences and effects.

By 1950, in Delta had operated almost exclusively Lipovani's population, very skilled fishermen, who are beneficiaries of agricultural land, of forests and of livestock. At that time, the landscapes were indeed a dream with a wonderful avifauna (Popovici & Mihail, 1981), and a insignificant human intervention. Delta's population, relied on the traditional style of the local resource exploitation from land and water area.

Romanian delta has undergone complex processes of metamorphosis that some of them have not proven viable in economic terms, most becoming factors reducing productivity of the area, especially for the local population.

Since 1990, the population of the Delta area has seen a decrease of about 30%, primarily due to the endemic lack of infrastructure, the decline of traditional activities, the high rate of unemployment, restriction of freedoms fishermen and the worsening state of the environment. All this resulted in impoverishment of the population and its aging because, with facilities on the free movement of persons, young people have migrated in search of jobs attractive.

Between economic and environmental forms of aggression that have befallen the Delta, some easily transpire through its harmfulness.

Damming of large areas of marsh, regarded as unprofitable, were drained and turned into farmland. In this manner, to Delta have stolen about 50,000 ha, located in 11 sites. Since 1990, froze the process that was planned to continue until to the area's recovery, which would have become of 144,000 ha, according of schedule planning delta's Romanian. These are difficult to maintain, because they require irrigation, soil improvement works, plus salinity trend, coupled with the negative effect of fertilizers and pesticides on agricultural land which passes into the groundwater and into the Danube.

Construction and upstream dams have altered the natural flooding in aimed to transform this land flooded farmland (Botzan, 1998).

In the 50s, appeared the concept of reed-intensive operating plan, for which it was built, the Chiscani-Braila, a pulp and paper combined. Reed exploiting, quite irrational, led to the destruction of its root, causing a devastation of 60,000 ha. Currently, intensive exploitation of reed was stopped, being now, rational performed (B canu, 2002).

Although, the Delta fishery production was significant, economic organization for its use was performed in cooperative premises, being created to support intensive production of farm type. In this project were committed great errors, has been hijacked natural course of water flow in enclosures, creating stagnant areas and normal airflow. The unventilation and abundance of toxic substances with water entering the Danube, to which were added those from agricultural areas, favored eutrophization and drastic loss of fish due to lack of oxygen, establishment of agricultural and fishery premises of diminishing natural area over 20% of the area.

Extending artificial navigation channels have negatively affected the hydrological regime and water quality from lakes, for example, were cut, on the arm of St. George, Channels to shorten navigation appearing the clogging phenomenon in the area where the water flow is not flow normal.

Industrial pollution and effluents accumulate in fish eating birds eggs and eggs as well as pelicans and cormorants, led to a decrease in their reproductive capacity (Sobaru & N stase, 2000).

Another form of aggression against Delta was an attempt to exploit quartz sand, very pure and fine, from the sea levees Letea and Caraorman, although they were protected, since 1961, in the nature reserve, because of specific

morphology and sub-Mediterranean vegetation covered them.

For this project builded an entire infrastructure, intended to ensure the full exploitation of sand. Thus, we have built a special miniport, various buildings, warehouses and transport lines. So they destroyed one of the places of great scientific interest and landscape of the Danube Delta.

There was also an attempt to exploit heavy mineral sands on Chituc but luckily failed due to the events of December 1989. Following these works remained several disused buildings and equipment that come in contrast with the beauty of landscapes. Furthermore, the tourism and fishing, wild charged, brought great disservice removable ecosystems (B canu, 2002)..

Currently they have taken steps to conduct a rational fishing. There are several tourist routes established to allow visitor access (Nenciu, 2009).

On the W coast of the Black Sea, physical-chemical analysis used in water monitoring in the Romanian Black Sea coast, in the last two years is based on a total of 200 samples collected throughout the water column, the on a network of 38 stations located in 6 oceanographic expeditions.

Nutrients in seawater were quantified by spectrophotometric analytical methods and validated laboratories.

Transparency was measured in-situ with Secchi disc and ranged between 0.5 and 6.5 m maximum was recorded in May coastal waters, near Constanta.

Salinity was determined by Mohr Knudsen method. Thus, salinity of transitional waters, marine and coastal, Romanian seaside area has ranged from 0.50, to 18.63 PSU.

Dissolved oxygen in marine environment was measured by Winkler method and is a very important variable in assessing the functionality and behavior of representative ecosystems, especially that

could be easily measured by chemical methods.

Heavy metal contamination area W of the Black Sea can be correlated with urban and industrial sources, port facilities, sewage plants.

In relation to environmental quality standards in the field of water recommended by European legislation, was observed for all investigated elements that annual mean values calculated were classified below the values-threshold.

During February-March 2010, organic pollutants analysis was performed on a total of 75 water samples and 60 sediment samples, collected from all stations on the Romanian seaside. Monitoring conducted covering the types of water to 20 meters isobath (Table 1).

Sea level, the status indicator of the coastal zone, presented in 2010 a positive constant deviation from the annual average, the Duarte whole year. Annual average was +23.5 cm higher than the annual average, from 1933, to 2009, the annual average becoming the maximum of annual averages for the period mentioned.

Marine ecosystem status in phytoplankton composition were identified 191 species, varieties and forms belonging to seven taxonomic groups. Abundances and biomass of phytoplankton in all areas of the Black Sea coast of W were characterized by seasonal variability, spatial and temporal.

Zooplankton was dominated (2010) trophic component in March, May, July and august and the untrophic was dominated in May and July. During the 2010's highly identified for the first time, the Romanian seaside, *Oikopleura dioica* species already reported in the Black Sea basin, Ukrainian and Russian researchers. Species can be considered adapted to the Romanian coast of the large number of copies

Endangered species (I refer especially to marine mammals) No 2010, dolphins were not part of a special monitoring program, but have been

observed in flocks of 2 to 50 copies, both in near shore and offshore areas.

State marine fish stock in the maritime sector (area W) Commercial fishing was done in two ways: fishing with active gear performed by Trawler vessels, coasters, at depths greater than 20 m and fishing with fixed gear, practiced along the coast in 20 points fishery between Sulina and Vama Veche (3-11 m).

The evolution of biomass for major fish stocks are in Table 2.

Impact indices shows that the percentage of species whose stocks are outside safe limits was relatively similar to that of previous years, close to 90%. Overcoming the limits of safety is not only the Romanian maritime operation, most fish species with trans boundary distribution, which requires regional management. The complementary percentage of the Romanian species catches, continue to be at a level similar to that in recent years, being 25%

3. Protective measures and programs for sustainable development Danube Delta ecosystem and W area of Black Sea

Legislative framework for protection of Danube Delta

Danube Delta was declared in 1990, by the Romanian Government, biosphere reserve, judgment then confirmed by Parliament by Law no. 82/1993. In 1990, the Danube Delta Biosphere Reservation (DDBR) was included in the Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat water is currently the only wetland in Romania, as part of the prestigious International Convention comprising approximately 400 wetlands in over 90 countries across the globe, so Delta occupies a central position within them, the great diversity of ecosystems and habitats that shelters (Romanescu, 1996.)

Division of Danube Delta in zones with different levels of interference and human activity

Investigations conducted since the time of application to be integrated Romania's economic and political structures of the EU, tracking work progress on environmental quality, reveals a multitude of sources of pollution whose effects are felt by biome sensitivity of reserve generating negative consequences, environmental and economic.

In order to protect and secure the beauties and riches of this region, Danube Delta Biosphere Reserve was divided into three main areas, which are allowed different levels of interference and human activity.

In "strictly protected areas" (less than 9% of the area DDBR) access is permitted only for research, environmental monitoring and surveillance, and economic activities (hunting and fishing) are prohibited. Currently they have taken steps to conduct a rational fishing. There are several tourist routes established to allow visitor access (B canu, 2002).

Limited economic activities, including small fishing and reed harvesting is allowed in "buffer zones" (Nicolaev, 1994) covering 38% of the area.

Most of the surface DDBR (53%) is classified as "economic zone", which can be exploited natural resources that include naturally flooded areas, human settlements and polders.

It is certain that recovery efforts are being made to the Delta, primarily through overarching objectives of the existence and operation DDBR which provide:

- Preservation of landscapes, plants, animals, habitats and ecosystems;
- Promoting sustainable use of resources Biosphere Reserve;
- Providing support, based on research results through

management, education, training and services.

With the declaration of the Danube Delta and its annexes geo-morphological, as a biosphere reserve, which was included in the network of similar reserves, grouped under the name "Man and Biosphere" (MAB) of UNESCO.

These reserves (Map no. 1), and represents terrestrial and coastal ecosystems were held in the MAB Programme to promote and demonstrate the possibility of a balance between man and nature.

Sustainable development ecosystem in the western areas

Romania has a coastline length of 244 km and is divided in economically into two main areas, stretching from the Gulf Musura, from Cape Midia (the north - 164 km) from Cape Midia - Vama Veche (southern Area - 80 km).

Romanian seaside area (Map no. 2) face problems in terms of habitat destruction, coastal erosion, water pollution and depletion of natural resources. Population and tourism development, large-scale exploitation of natural resources and the rapid development of infrastructure led to severe degradation and decline in the quality area).

In these conditions an integrated approach to coastal sustainability, both economically and environmentally, to coordinate multiple interests to use all resources, with social, economic and ecological maximum for present and future generations.

Regional cooperation Sustainable development of the coastal zone requires collaboration of all Black Sea countries. In this sense was developed Strategic Action Plan for the Rehabilitation and Protection of the Black Sea, both in urban and rural areas, obtaining a diverse marine ecosystem of biological, containing varied and viable populations of higher organisms, including marine mammals and sturgeons to support livelihoods results in

sustainable activities, such as fishing, aquaculture and tourism in all Black Sea countries.

In the specific marine research institutions, and the Black Sea Commission is considering the following areas.

It is necessary to preserve biological diversification, monitoring and assessment of pollution, developing common methodologies in the internal management of the coastal zone, pollution control from land-based sources.

To implement sustainable development in the coastal area since 2010, began carrying out relevant projects, national and international participation:

national Projects.

- The dynamic interactions of the unbiotic component marine ecosystem climate change and anthropogenic influence present;
- Work biotic components of the marine ecosystem under the influence of increasing human pressure and climate change;
- Urban Area Plan (Coastal Zone, southern sector, Cape Midia - Vama Veche) international Projects:
- CE/PC& European coastal – shelf sea operational observing forecasting system (ECOOP);
- NATO Bio optical characteristics of the Black Sea;
- CE/PC6 Upgrade Black Sea scene (UBSS);
- CE/PC6 Plan European infrastructure for Ocean&Marine Management (SEADATANET) ;
- CE/PC6 Southern European Seas: Assessing and modeling ecosystem changes (SESAME)

- CE/PC7 Scientific and Technologic collaboration for the study of sea level changes and vertical crustal movements at the Western Black Sea (EMODNET).

Spatial planning From 2010, were continued and developed education and research in Maritime Spatial Planning (MSP), the process of analyzing and allocating the spatial and temporal distribution of activities in the Romanian sea.

In this respect, for the northern Romanian seaside, were addressed three case studies complex in terms of PSM, an area which is under direct double, continental and marine influence factors. They took into account issues related to establishing reference area, identifying activities and manifested pressures, human impact assessment.

The main anthropogenic pressures identified in the Romanian coastal come from increased development of various social and economic activities in the coastal countryside: tourism and recreation, construction (holiday houses in tourist areas), expansion and modernization of existing tourist ports and activities dredging, ports and shipping, shipbuilding, marine fisheries, agriculture and food industry, petrochemical industry - refineries, manufacturing industry etc..

4. Conclusions

Given that the Danube Delta, in terms of landscape and tourism throughout the height of the Danube, it must continue its ecological reconstruction until complete recovery of original habitats, restoration biocenosis, eliminating as far as possible, human intervention, except exploitation exercised by traditional means B canu, 2002) by the local population.

Status and trends in Romanian marine and coastal environment, were monitored from 2010, in terms of physical, chemical and biological compared to the reference period of the '60s or more recent

data. State coastal marine environment in 2010, confirms the general trend of slight improvement mentioned parameters and recovering the state of the ecosystem.

In order to protect and conserve marine biodiversity coherent network of marine protected areas, national and European interest, was developed from 2010, new proposals and awarding custody of most of the existing ones.

Summary data for 2010, compared to the historical status and evolution of Romanian coastal environment, are contributing to the "Report on the environment in Romania", the Ministry of Environment and Forests.

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TABLES AND MAPS

Table 1
The oil pollution level

| Typology of water bodies | 2008 2011 media µg/l | 2008 2011 median µg/l | 2012 media µg/l | 2012 median µg/l | no. tests |
|--------------------------|-------------------------------|--------------------------------|-----------------------|------------------------|--------------|
| Transitional waters | 468.0 | 378.0 | 144.6 | 129,8 | 67 |
| Coastal waters | 494.6 | 422.0 | 55.0 | 30,8 | 316 |
| Marine waters | 423.6 | 197.0 | 180.1 | 158,8 | 28 |

Source: *Recherches marines*, no. 41/2012, p. 39.

Table 2
Value of stocks for the main fish species (W Black Sea) (tonnes)

| Specia | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|----------------------|--------|--------|--------|--------|--------|--------|
| Sprat | 45,000 | 14,750 | 60,000 | 60,000 | 60,000 | 60,000 |
| Whitin | 8,000 | 7,000 | 6,000 | 8,500 | 10,000 | 11,000 |
| Anchovy (Hams) | 19,000 | 20,000 | 20,000 | 20,000 | - | - |
| Gobies (Sea gudgeon) | 600 | 600 | 600 | 500 | - | 500 |
| Turbot (Calcan) | 1,080 | 1,150 | 1,300 | 2,356 | 1,500 | 1,350 |
| Shark | 1,650 | 2,000 | 4,300 | 1,450 | 2,500 | 2,500 |

Source: *Recherches marines*, no. 41/2012. p. 41

Map no. 1
Delta - natural reservations



Map no. 2
Romanian seaside (Western area of Black Sea)

