Impact on biodiversity and ecosystems Bîstroe Canal in the Danube Delta Biosphere Reserve

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Abstract. Danube River had formed, over time, a main artery of transport and communications between countries bordering the Black Sea basin and Central Europe. By making the Canal connecting the Rhine - Main - Danube, the importance of this transport corridor has increased. Mouths of Danube, over the geological evolution, has developed a major delta system, which according to World Wildlife Fund (WWF), being „the most important wetland in Europe”.

Making the waterway Bîstroe Canal would be a possible negative impact on biodiversity and deltaic ecosystems (land and water) and coastal areas in Romania and Ukraine. The impact could be irreversible, leading to changes in the delta areas, transforming them into some swampy lake areas, the loss of fauna and vegetation, changing migratory routes for some ornithologic and ichthyologic species.

Key-words: Danube delta, biodiversity, ecosystem, biosphere reserve, Canal, Bîstroe, impact.

1. Introduction

Danube is part of the ten Pan-European transport corridors. On Chilia, its transport have been certified a historic interest for Ukraine since 1830. This country used to the early 60s of the last century, three waterways: Arm Bistro (Novo Stambulsk), Ochakov Canal and Canal Provra. In the same time, arm Bystroye was clogged and became impassable, and in the ’90s, the same phenomenon has occurred for Provra Canal.

As a result, river’s transport became impossible to practice on the two Canals on the territory of Ukraine, for which they were diverted by the Romanian navigable areas. That phenomena have been internal decay Ukrainian transport companies, it producing a decline of port infrastructure, with implications for the socio-economic area.

2. Brief history

Analyzing these effects, but taking into account other concerns such as oil reserves discovered at the Mouths of the Danube, the Black Sea continental shelf along the perimeter of the Serpent Island, geo-strategic interests and military order, the Committee of Ministers of Ukraine has initiated the first steps to achieve final construction of Bîstroe Canal.

The first work for the construction began in October 2001, by widening the width of waterway from 2-2.5 m to 5.85 m, a distance of 7 km downstream from the town Vîlkovo (near Periprava - Romania). This event was first reported by the governor of the Danube Delta Biosphere Reserve, Virgil Munteanu.

In May 2004, Ukraine was officially begin work for Bîstroe Canal, after having changed the status of protected namesake arm, without consulting the experts in this domain (reduction of 5600 ha of Ukrainian delta, including its reserve).

In this regard, the project of building a waterway Canal provides a length of 168 km for large vessels and has four sections:
- a Canal from the sea and surrounding dam, with a length of 3 km and depths of 7-8 m, bounded by walls for protection;
- sector sea - Bîstroe Canal - Vîlkovo;
- Vîlkovo - Reni - Ceatal Ismail;
- Ceatal Ismail - Reni.

Following hydro work commences in August 2004, Romania had requested, under the Espoo Convention, for a commission of inquiry to establish the interstate impact.

In 2006, the committee had noticed the negative impact of the Canal on the Danube Delta ecosystem, so that in 2007 Romania Espoo Commission for failure had bring agreement between the two countries, following the same year that Ukraine to accept and participate in joint public debate, engaging in the same time to commission recommendations.

In August 2008, the Ukrainian government had revoked the decision regarding the second phase of construction for the Canal, and in July
2009 approved the tenders for further work.

By making the Canal Bîstroe, Ukraine violates a number of international commitments made, being a signatory to at least 11 agreements, of which the most important being:

- Convention on Wetlands RAMSAR (1971);
- Convention on World Cultural and Natural Heritage, Paris (1975);
- Convention on Conservation of Wildlife and Natural Habitats in Europe, Berna (1979);
- Convention Espoo (1991);
- Convention on Biological Diversity, Rio de Janeiro (1992);
- Convention on Protection and use of transboundary watercourses and international lakes, Helsinki (1992);
- Convention on Cooperation for the Protection and Sustainable Use of Danube River, Sofia (1994);
- Agreement between the Government of Romania and the Ukraine on cooperation in border water management, Galați (1997).

3. The geographical position of the Danube Delta Biosphere Reserve and Bîstroe Canal

Danube Delta Biosphere Reserve is located in the eastern part of Europe and lies at the intersection of parallel of 45° north to 29° east longitude. The total area of the reserve is 5800 km², of which more than half (3510 km²) is what is called Delta, the remaining area being divided between meadow river (Isaccea - Tulcea, 102 km²), Razim - Ovidiu (1145 km²), band adjacent to the Black Sea (1030 km²) to the -20 m isobath and the river itself between the Pisicii and Isaccea Bends (13 km²) - fig. 1.

In Europe, the Danube Delta is the third-largest after that of the Volga (13,000 km²) and Kuban (4300 km²), but the 22nd in the world.

The same geographical unit has a shape and structure of a typical delta. Starting in the right locality Pâltăgeanca (Ceatalul Chiliei), where the Danube splits first two arms (Chilia - 120 km - and Tulcea - 17 km), the second arm being separated downstream from Tulcea (Ceatalul Sfântu Gheorghe) in the other two arms: Sulina (63.7 kilometers) - which, before being corrected, was about 84 km - and Sfântu Gheorghe (108 km).

The average altitude of the Danube Delta is 3.6 m Pâltăgeanca, 0.46 m to Sulina, with an average slope of 0.006 %.

Danube Delta Biosphere Reserve was declared by Government Decision no. 983/1990 and Law no. 82/1993.

Fig. 1. The geographical position of the Danube Delta Biosphere Reserve and Bîstroe Canal in this area

4. Biodiversity and ecosystems of the Danube Delta Biosphere Reserve

Danube Delta presents an impressive biodiversity, being also the largest area of its kind in Europe. It represents a main habitat for many species of plants, animals and birds, some of them unique in the world. Over time, especially in contemporary times, through the negative anthropogenic, terrestrial habitats have suffered less than water, whereas the latter are more easily polluted, uncontrolled exploitation of plant resources by area and not only led to greater damage to these resources.

Regarding the flora, it must be said that the Danube Delta hosts over 50% of the 3,800 plant species recorded in Romania. From an environmental perspective, the most interesting and valuable plant communities are found in area banks Letea and Caraorman associated with a vast system of areas with sandy soils, types not present even in the Mediterranean.

The fauna reserve hosts 224 strictly protected species, including 44 mammal species with a habitat existing only here. This area consists in a shelter of many species of rodents, birds and fish, many of them also living in the mentioned area (fig. 2).
5. The possible impact of the Canal Bistroe on delta’s ecosystems and biodiversity

Regarding the distribution flow leakage on the three branches of the Danube Delta, there is a change over time (fig. 3).

If the past century most of the amount of water drained (72%) was taken over by Chilia bend, in 1996 there is a reduction in the amount to 55.5%, thanks to the work carried out in the hydro adjustment made for Arms Sulina and Sfântu Gheorghe, for easy transport on Danube.

With the work made for the construction of Bistroe Canal (dredging and deepening), would lead to a new redistribution of fluid flow to the current period.

In the north of the Danube Delta, south of Chilia, following the completion Bistroe Canal, it is possible to increase flow, and the flash will be affected by a number of locations on the Romanian territory.

Increased flows on the northern arm would lead to the speed of flow, which will accelerate the development of the Ukrainian Black Sea coast.

Also, the work of protection which are intended to be made in the extension of that canal, they can divert the southeast coastal current, which would have some negative consequences for coastal areas south of Sulina.

Repositories dredged material will affect habitats which are dependent on the dominant currents, marine species, leading to a drastic reduction in number of migratory pelagic fishes and their migration to Sfântu Gheorghe bend (herring and sturgeon).

Another result from the work already been completed during the dredging and disposal of sand dredged brooding on the banks of the Canal led to the disappearance of three colonies of Sandwich Tern, but also the formation of mineral deposits on Vostohne Arm, with damage to the natural complex Iermakov Island (Ukraine).

Work adjustment for Chilia at the Mouth of the Bistroe Canal entrance will have an impact on the Romanian seaside in central and southern sectors. These modifications will consist in replacing the phenomena of erosion and sedimentation due to changes in time of current coastal route, impact, and the salinity regime.

The materials resulting from dredging and maintenance works of the canal can cause a low alluvial transport south of Sulina, which will affect Romanian fairways. In the same time, this fact will...
change the hydrological regime of the bay Musura, which will speed up the clogging, but will rise formation conditions of the islands that will make a gulf in an area lake with low water.

However, redistribution of flow of the Danube River and the mouth of the estuary, with a greater contribution to Chilia would lead to a reduction in the flow canals, streams and lakes of the delta complex.

If the flows are reduced due to prolonged droughts, would achieve reductions in aquatic areas, developing wetlands which irreversible ecological consequences. Similarly, the low level of water would help fixing bottom or floating on the shore of breeding colonies of pelicans, which would ease access to predators during nesting and hatching.

For the high water, nesting areas may be flooded, which would lead to a favorable migration to other areas. Reducing flows on Sfântu Gheorghe would generate an increase in the case of warping phenomena, which would change the structure, covering bio-plant and wildlife.

These actions affect the breeding places of conservation of fauna, particularly birds (pelicans), such as colony Roșca - Buhaiova (Canal Zone Bistroe being their food place), but will disappear also a number of species and egrets, herons spoon, cormorants etc.

6. Conclusions

Fitting hydrotechnics Canal Bistroe in delivering a heavy transport would have a major and irreversible impact on biodiversity and ecosystems in the Danube Delta Biosphere Reserve (Romanian and Ukrainian parts). The repercussions will be felt by the redistribution of fluid leakage, which will lead to a clogging of the southern part of the Danube Delta, replacing the morphohydrographical and geomorphological phenomena and coastal delta will affect fauna and flora of the area, leading to a rearrangement of lines ornithological migration, redistribution of the ichthyofauna (brackish migratory species will prefer other lines of spawning migration to the south), will disappear colonies of birds, particularly white pelicans (the Danube Delta being 70% of the population of white pelicans on the globe).

Remains to be seen some increase risks of accidental pollution by oil, dangerous chemicals, pesticides, radioactive materials, but also the possibility of migrant species via ship ballast water.

In the same time, Romania could suffer economic losses of approx. 1.5 million U.S. dollars annually by taking over 65% of its transit fee payers Romanian state.

References