СЕКЦІЯ 9. МІЖНАРОДНІ ЕКОНОМІЧНІ ВІДНОСИНИ

Golikova Olha
PhD in Economics, Scientific Secretary of Institute, Researcher,
State Organization "Institute of Market and Economic&Ecological Researches of National Academy of Sciences of Ukraine"
Odesa, Ukraine
Karpenko Olha
PhD in Economics, Senior Researcher,
State Organization "Institute of Market and Economic&Ecological Researches of National Academy of Sciences of Ukraine"
Odesa, Ukraine

DOI: https://doi.org/10.36059/978-966-397-593-1-50

SCIENTIFIC AND TECHNICAL COOPERATION ON IDENTIFICATION OF KEY ECOSYSTEM TRANSFORMATIONS OF STURGEON POPULATIONS IN THE DANUBE AND DNIPRO BASINS OVER THE LAST FIVE DECADES

Research within the framework of the international project SturNet (BSB 00172) highlights the importance of transnational cooperation. Bringing together a consortium of 6 countries (OBB (Bulgaria), GeoEcoMar (Romania), ECCC (Moldova), AUTH (Greece), GTU (Turkey) and, the State Organization "Institute of market & economic & ecological research of the National academy of science of Ukraine" (Ukraine)) [1], the project provides a harmonized approach to data collection, policy development and conservation efforts. Knowledge sharing and shared resources improve conservation strategies, contributing to the protection of sturgeon populations in the Black Sea basin. Key components of this phase were the collection and analysis of historical data on atmospheric conditions, sea temperature, salinity, plankton and currents to establish a baseline for long-term environmental monitoring. Sturgeons are among the oldest surviving vertebrate groups and are important bioindicators of the state of aquatic ecosystems. In the Danube and Dnipro

river basins, they play a key role in maintaining ecological balance, but their numbers have declined sharply in recent decades [2; 3].

The relevance of the study is due to the need for a comprehensive assessment of changes in ecological conditions that have occurred in the aquatic ecosystems of the Danube and Dnipro over the past 50 years. International monitoring of long-term multidisciplinary data, in particular temperature regimes, water salinity, currents, biological productivity and anthropogenic impacts, allows us to establish patterns of changes in sturgeon populations and identify the main risk factors for economic cooperation.

The main changes in hydroecological regimes in the Danube and Dnipro basins:

- *Climate change:* Over the past decades, there has been a steady trend towards an increase in the average annual air and water temperature in the Danube and Dnipro basins. The increase in the temperature of the aquatic environment directly affects biological processes, including the metabolism of aquatic organisms, reproductive cycles and the survival of young sturgeon. The increase in temperature leads to a decrease in the concentration of dissolved oxygen in the water, which negatively affects the development of eggs and larvae. In addition, changes in the temperature regime cause disruptions in the seasonality of spawning and migration processes and, as a result, changes in fishing in the region.
- *Changes in the hydrological regime:* In the Danube basin, significant changes are associated with fluctuations in water level and transformation of runoff, which is due to both climatic factors and regulation of the river bed. The reduction in natural variability of hydrological processes leads to the degradation of spawning areas. In the Dnipro basin, the hydrological regime has changed significantly due to the creation of a cascade of reservoirs. The construction of hydroelectric power plants has caused fragmentation of the river bed, changes in flow velocity and transformation of natural bottom biotopes. A particularly significant factor was the destruction of the Kakhovka HPP in 2023, which led to a sharp decrease in water level, exposure of bottom sediments and disruption of the hydrochemical balance.
- *Transformation of the salt regime:* In the delta areas of the Danube, there is an increase in the interaction of sea and river waters, which changes the salinity of the environment. In the Dnipro basin, after the destruction of reservoirs, a local increase in water mineralization is also noted. Changes in the salt regime negatively affect the physiological state of sturgeons, which require stable conditions for development.

Natural factors affecting sturgeon populations:

• *Hydrothermal fluctuations:* Temperature fluctuations and changes in water level determine the availability of spawning grounds.

• *Changes in the trophic base:* sturgeons are largely dependent on the state of the population of benthic invertebrates and plankton.

• *Natural geomorphological processes:* accumulation of bottom sediments and changes in the structure of riverbeds can lead to the degradation of traditional spawning grounds. As a result, the area of suitable biotopes for the development of sturgeon fry decreases, logistical chains for economic entities are disrupted, and monitoring aspects of international economic and environmental cooperation become more complicated.

Anthropogenic factors of degradation of sturgeon populations:

• *Construction of hydraulic structures:* dams and reservoirs block fish migration routes to spawning grounds and change the natural conditions of the flow.

• *Water pollution:* industrial effluents, agricultural fertilizers, and household waste degrade water quality.

• *Overfishing and poaching:* Despite the ban on commercial fishing, poaching remains a serious problem, especially due to the high value of black caviar.

• *Urbanization and economic activity:* development of port infrastructure, dredging, and regulation of riverbeds lead to the destruction of natural biotopes and a decrease in biodiversity.

Table 1

Main factors influencing sturgeon populations

Factor	Type of impact	Consequences for sturgeon
Increasing water temperature	Natural/climatic	Disruption of reproductive cycles
Construction of hydroelectric power plants	Anthropogenic	Blocking migrations
Water pollution	Anthropogenic	Decreased survival of young
Salinity change	Natural	Disturbances of physiological processes

Residual natural populations of sturgeon are preserved in the Lower Danube, as confirmed by the registration of juveniles of some species in recent years. This region remains an important natural spawning ground. In the Dnipro basin, the situation is more critical. Most of the natural populations were lost due to the construction of hydroelectric facilities. However, the

opening of migration routes after the destruction of the Kakhovka HPP creates potential opportunities for natural population recovery.

The implementation of the following comprehensive measures is promising for stabilizing and restoring sturgeon populations [4]:

1. Restoration of spawning grounds by reconstructing natural riverbed areas.
2. Creation of effective fish passage systems on hydraulic structures.
3. Strengthening monitoring of water quality and the biological state of ecosystems.
4. Use of modern research methods, in particular molecular genetic technologies.
5. Development of international cooperation within environmental protection programs.

Thus, monitoring of changes in ecological conditions in the Danube and Dnipro basins over the past 50 years indicates a significant transformation of hydrological and hydrochemical regimes, which negatively affected the state of sturgeon populations. Among the main factors reducing the number of these species are the construction of hydraulic structures, water pollution, climate change and destruction of natural biotopes. At the same time, modern ecological changes create new conditions for the potential restoration of sturgeon migration routes and the intensification of international cooperation in the studied regions, in particular, transboundary scientific and technical cooperation, the involvement of foreign specialists and investments.

A comprehensive analysis of natural and anthropogenic factors is a necessary basis for developing effective measures to preserve sturgeon fish and restore their populations. The study has practical significance for the formation of effective strategies for the conservation of sturgeon species that are under threat of extinction and listed in the Red Book of Ukraine.

References:

1. Network for the Preservation of Sturgeon and for the Sustainability of the Black Sea Basin Eco system. Programme 2021–2027 Interreg VI-B NEXT Black Sea Basin. Available at: https://surl.li/vogtbl

2. Convention on Cooperation for the Protection and Sustainable Use of the Danube River. 1994. Database “Legislation Ukraine”. Available at: https://zakon.rada.gov.ua/laws/show/998_800#Text

3. Convention for the Protection of the Black Sea against Pollution. 1992. Database “Legislation Ukraine”. Available at: https://zakon.rada.gov.ua/laws/show/995_065#Text

4. Action plan of preservation sturgeon of fish in Ukraine for 2021-2030. 2020. Ministry of protection environment and natural resources of Ukraine. Available at: https://surl.li/rtdpbu .

5. Data of 50-year ecological observations of the Dnipro and Danube basins : project report (conclusion) / ed. O.O. Karpenko. Odessa : State Institution “IREED NAS of Ukraine”, 2025. 340 p.