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## ANALYSIS OF ANTHROPOGENIC AND NATURAL IMPACTS ON STURGEON IN THE RIVER ECOSYSTEMS OF UKRAINE

The interrelation between natural and anthropogenic factors determining the state of sturgeon populations in the basins of the Danube and Dnipro Rivers; and this is a superior task for international collaboration in spheres of ecology, biodiversity and blue economy. Historical hydrological, climatic, and biological data were analyzed to identify key trends in water temperature, salinity, current dynamics, and plankton activity. Major challenges caused by climate change, hydraulic structure destruction, pollution, and habitat degradation were identified.

Sturgeon species are relict fish that play a vital role in maintaining biodiversity and the ecological balance of river ecosystems. Their decline indicates the degradation of aquatic environments. In Ukraine, the main habitats of sturgeon are concentrated in the Lower Danube (near the city of Vylkove) and the Dnipro River (near Zaporizhzhia, downstream from Khortytsia Island). The current state of these populations reflects the combined influence of natural and human-induced factors – from climate change to intensive exploitation of water resources. The research is conducted within the framework of the “Network for the Preservation of Sturgeon and for the Sustainability of the Black Sea Basin Ecosystem” (SturNet, BSB00172) project, funded by the Interreg NEXT Black Sea Basin Program. The goal of the project is to protect and preserve sturgeon in the Black Sea basin [1].

Project Partnership: OBB (Bulgaria), GeoEcoMar (Romania), ECCC (Moldova), AUTH (Greece), GTU (Turkey). From Ukraine, the official project

partner is the State Organization "Institute of Market and Economic & Ecological Researches of the National Academy of Sciences of Ukraine" (IMEER).

The analysis was based on long-term historical observations of water and air temperature, salinity, currents, and phytoplankton conditions [2]. Statistical and correlation analysis methods were applied to assess the influence of natural parameters and anthropogenic factors on ecosystem status. The data sources included the Ukrainian Hydrometeorological Institute, the Central Geophysical Observatory, and research materials within the SturNet Project (2024–2025).

The increase in the average annual water temperature in the Dnipro and Danube basins by 1.5–2 °C over the past 50 years has reduced oxygen levels and disrupted the seasonal dynamics of sturgeon spawning [3; 4]. Changes in salinity, especially in the Danube Delta, have led to the decline of freshwater biocenoses. Climate fluctuations also caused irregular water flow, which affects the availability of spawning habitats.

The main anthropogenic drivers of sturgeon population decline include water pollution from industrial, agricultural, and domestic sources, hydrotechnical construction, eutrophication, and catastrophic events such as the destruction of the Kakhovka Hydroelectric Dam in 2023, which caused hydrological changes and the loss of biological resources [5]. Table 1 lists the «Main natural and anthropogenic factors influencing sturgeon populations».

Table 1

**Main natural and anthropogenic factors influencing sturgeon populations**

| Type of impact | Examples | Ecological effect |
|---|---|---|
| Natural | Increase in water temperature, fluctuations in water level, salinity changes | Altered spawning cycles, reduced oxygen content |
| Anthropogenic | Pollution, dam construction, eutrophication, Kakhovka HPP destruction | Loss of spawning grounds, decline of populations |

Summarizing our research, we outlined some conclusions:

1. Sturgeon populations in Ukraine are critically endangered due to the combined effects of natural and anthropogenic factors.

2. Climate change, rising water temperatures, altered salinity, and declining water levels significantly affect their life cycles.

3. Anthropogenic factors – pollution, river flow regulation, and morphological changes – remain the main obstacles to sturgeon restoration.

4. An integrated monitoring system, restoration of spawning grounds, and strengthened international cooperation under initiatives such as SturNet are required.

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