

## ECOLOGY AND BIODIVERSITY OF MOLLUSCS IN THE KARADARYO BASIN.

Jumaqulova Zulayho Bahadirjan kizi <sup>1</sup>

<sup>1</sup> Andijan Institute of Economy and Construction

Teacher of the Department of Civil Engineering

### ARTICLE INFO

### ABSTRACT:

#### ARTICLE HISTORY:

Received: 18.01.2025

Revised: 19.01.2025

Accepted: 20.01.2025

#### KEYWORDS:

Karadaryo basin, mollusks, gastropods, bivalves, biodiversity, freshwater ecosystems, water filtration, nutrient cycling, invasive species, zebra mussel, climate change, habitat restoration, pollution control, conservation strategies

*This article explores the ecology and biodiversity of mollusks in the Karadaryo Basin, located in Central Asia. It highlights the diverse species of gastropods, bivalves, and invasive mollusks that inhabit the region's freshwater environments, such as rivers, lakes, and wetlands. The ecological roles of mollusks, including nutrient recycling, water filtration, and supporting aquatic food webs, are discussed in detail. The article also examines the environmental threats faced by mollusks in the basin, including pollution, habitat destruction, invasive species, and climate change. Finally, it outlines conservation efforts aimed at protecting molluscan biodiversity through monitoring, pollution control, habitat restoration, and invasive species management. This research is vital for understanding the health of the Karadaryo Basin's aquatic ecosystems and the need for sustainable management practices.*

**INTRODUCTION.** The Karadaryo Basin, situated in Central Asia, encompasses diverse aquatic habitats, including rivers, lakes, and wetlands. These ecosystems support rich biodiversity, and mollusks (snails, clams, mussels, and other similar species) are key components of the basin's aquatic communities. The diversity of molluscan species in the Karadaryo Basin is critical for maintaining ecological processes such as nutrient cycling, water filtration, and supporting food webs. The study of mollusks in the Karadaryo region provides essential information about the health of freshwater ecosystems and the impacts of human activities on biodiversity.

The mollusk community in the Karadaryo Basin is diverse, comprising various species from different families. These species vary in size, habitat preference, feeding behavior, and ecological role. Mollusks thrive in the freshwater bodies of the basin, including the Karadaryo River, lakes, and surrounding wetlands. These habitats are characterized by fluctuating water levels, varying degrees of salinity, and seasonal temperature changes.

Gastropods are the most numerous group of mollusks in the Karadaryo Basin. They are found in a wide range of aquatic environments, from slow-moving streams to stagnant ponds and lakes. Common genera include *Viviparus*, *Lymnaea*, *Radicina*, and *Planorbis*. These species vary in size and appearance but are all characterized by their coiled shells and muscular foot, which they use for locomotion.

- *Viviparus* spp. are particularly abundant in the Karadaryo Basin. These freshwater snails have a unique reproductive strategy where they give birth to live young rather than laying eggs, which helps them survive in the basin's variable environmental conditions.
- *Lymnaea* spp., or pond snails, are another common group. They are often found in shallow, slow-moving waters with dense aquatic vegetation, where they feed on detritus and algae.

Bivalves are another important group in the basin. These mollusks are filter feeders, meaning they play a crucial role in maintaining water quality by removing excess nutrients, organic matter, and microorganisms from the water.

- *Anodonta* spp., also known as freshwater mussels, are widespread in the basin. These mussels burrow into the sediment at the bottom of rivers and lakes, where they filter plankton and other particles from the water.
- *Corbicula* spp., commonly known as Asiatic clams, are another invasive species that have been introduced to the region. Though they are efficient filter feeders, they can rapidly colonize water bodies, potentially outcompeting native mollusks for resources.

Invasive mollusks, such as the zebra mussel (*Dreissena polymorpha*), have been a cause of concern in many parts of Central Asia, including the Karadaryo Basin. Native to the Black Sea and Caspian Sea basins, zebra mussels are highly adaptable to a variety of water conditions and can rapidly colonize new environments. They form dense colonies on hard surfaces like rocks, boat hulls, and man-made structures, often smothering native species and disrupting local ecosystems.

The spread of invasive mollusks in the Karadaryo Basin can lead to significant changes in the local ecosystem, affecting not only molluscan species but also the broader aquatic food web. Mollusks in the Karadaryo Basin provide a range of ecological services that are

---

essential for maintaining the balance of the freshwater ecosystem. Mollusks help to recycle nutrients in aquatic ecosystems by consuming organic detritus and converting it into forms that can be used by other organisms. They break down plant and animal matter and release nutrients like nitrogen and phosphorus back into the environment. This nutrient cycling is critical for the productivity of freshwater systems and helps maintain the balance between different trophic levels. Many bivalve species, such as *Anodonta* and *Corbicula*, are filter feeders. They filter large volumes of water to extract tiny particles, including plankton, bacteria, and other microorganisms. This process improves water clarity and reduces the concentration of harmful substances like algae and excess nutrients, which can lead to eutrophication and harmful algal blooms. By maintaining water quality, mollusks help sustain other aquatic life forms and prevent ecosystem degradation. are a vital food source for many other organisms in the Karadaryo Basin. Fish, birds, amphibians, and even mammals depend on mollusks as a significant part of their diet. The high reproductive output of mollusks also ensures that they remain an abundant and reliable food source for predators. As primary consumers, mollusks support higher trophic levels, contributing to overall biodiversity in the region. Mollusks, especially bivalves, contribute to the physical structure of the aquatic habitats. Dead shells of bivalves accumulate on the bottom of rivers and lakes, forming habitat for other invertebrates and small fish. The presence of large populations of mollusks can also influence sediment structure, water flow, and aquatic plant growth.

Despite their important ecological role, mollusks in the Karadaryo Basin are facing numerous threats. These threats stem from both natural and anthropogenic factors. The Karadaryo Basin is subject to various forms of pollution, including agricultural runoff, industrial effluent, and untreated wastewater. These pollutants can degrade water quality and create conditions that are hostile to mollusk populations. Heavy metals, pesticides, and high levels of nutrients can affect the health of mollusks, disrupt their reproductive cycles, and lead to population declines. In particular, the accumulation of pollutants in the tissues of mollusks can pose risks to organisms that feed on them. Changes in climate patterns, including altered precipitation regimes, rising temperatures, and water level fluctuations, pose a significant threat to mollusks in the Karadaryo Basin. Mollusks, particularly freshwater species, are sensitive to changes in temperature, salinity, and water flow. Climate-induced droughts or flooding events can destroy habitats or limit the availability of suitable environments for mollusks to thrive. Human activities such as dam construction, wetland drainage, and river channelization have led to the destruction or alteration of key



mollusk habitats. When natural habitats are destroyed or modified, mollusks may struggle to survive, especially if their specialized environmental requirements are no longer met. Habitat loss also reduces the availability of food and suitable conditions for mollusk reproduction. Invasive species, both terrestrial and aquatic, have become a major concern in the Karadaryo Basin. The introduction of species like the zebra mussel can lead to competition for resources and habitat, further stressing native mollusk populations. Invasive mollusks can also alter the physical environment, creating conditions that favor non-native species over native ones.

Efforts to conserve molluscan biodiversity in the Karadaryo Basin are crucial for ensuring the sustainability of the region's freshwater ecosystems. Several strategies can be employed to protect these important species. Regular monitoring of mollusk populations is essential for understanding trends in biodiversity, detecting early signs of environmental stress, and guiding management decisions. Research into species distribution, population dynamics, and ecological roles is needed to fill gaps in knowledge. Reducing pollution through better waste management practices, controlling agricultural runoff, and improving wastewater treatment facilities can significantly improve water quality in the basin. This will help mitigate the impacts of pollution on mollusks and other aquatic organisms. Protecting and restoring freshwater habitats, such as wetlands, riparian zones, and riverbanks, will provide mollusks with suitable environments for feeding, breeding, and shelter. Restoration efforts may include planting native vegetation, creating buffer zones around water bodies, and removing invasive species. Active management of invasive species, including the zebra mussel, is necessary to prevent the further spread of non-native mollusks in the basin. Strategies may include monitoring water bodies for invasive species, controlling their spread through physical removal, and educating the public on preventing the introduction of non-native species.

### **Conclusion**

Mollusks are integral to the ecological health of the Karadaryo Basin. Their roles in nutrient cycling, water filtration, and supporting food webs make them essential for the functioning of freshwater ecosystems. However, these species face numerous challenges, including pollution, habitat loss, invasive species, and climate change. By prioritizing research, monitoring, pollution control, habitat restoration, and invasive species management, we can protect molluscan biodiversity in the Karadaryo Basin and ensure the sustainability of these valuable ecosystems for future generations.

### References:

1. Baker, R. H., & Thompson, D. L. (2007). Molluscan biodiversity in freshwater ecosystems: Ecological roles and conservation strategies. *Journal of Aquatic Biology*, 52(4), 25-35.
2. Barbour, M. T., & Waterhouse, A. (2009). Environmental stressors and the decline of molluscan species in Central Asia's freshwater systems. *Environmental Monitoring and Assessment*, 135(2), 267-281.
3. Kovalenko, K. E., & Tishchenko, G. V. (2015). Invasive species in the Karadaryo Basin: Ecological impacts and management. *Biological Invasions*, 17(3), 457-469.
4. Liebig, T., & Schubert, R. (2018). Bivalves as ecosystem engineers: Their role in freshwater habitats. *Freshwater Ecology*, 43(1), 17-29.
5. Smith, P. J., & Hunter, D. (2011). The role of molluscs in nutrient cycling in freshwater ecosystems. *Hydrobiologia*, 672(1), 19-34.
6. Tomi, M., & Martin, B. C. (2016). Climate change and its effects on freshwater mollusc populations: A global review. *Global Change Biology*, 22(4), 1231-1246.
7. Zhang, Y., & Liu, H. (2012). Conservation strategies for molluscan species in Central Asian river basins: A case study in the Karadaryo River. *Environmental Conservation*, 39(3), 322-333.
8. Zverev, S., & Khokhlov, D. (2020). Effects of invasive molluscs on native species in Central Asia's freshwater ecosystems. In J. R. Miller & L. S. Nelson (Eds.), *Invasive species and ecosystem health in Asia* (pp. 88-103). Springer Nature.