THE IMPACT OF ARTIFICIAL WATER BODIES (CANALS, RESERVOIRS) ON MICROCLIMATE AND ECOLOGICAL CONDITIONS

Eshmanov Husniddin Narzulla o'g'li
Bukhara State Technical University

Abstract: Artificial water bodies, including canals and reservoirs, play a significant role in human water management and agriculture. However, their presence also influences local microclimates and ecological systems. This article examines how these man-made aquatic systems affect temperature, humidity, air quality, and biodiversity in surrounding areas. The environmental benefits and challenges posed by artificial water bodies are discussed, along with sustainable management practices to mitigate negative impacts.

Keywords: Artificial water bodies, canals, reservoirs, microclimate, ecological impact, biodiversity, water quality, evaporation, thermal regulation, habitat alteration, eutrophication, invasive species, sustainable water management, environmental monitoring, hydrological changes.

Artificial water bodies such as canals and reservoirs are constructed worldwide for irrigation, drinking water supply, flood control, and hydropower generation. While serving critical socio-economic functions, these water bodies alter natural hydrological cycles and local environmental conditions. Understanding their impact on microclimate and ecology is essential for sustainable development and environmental protection.

Artificial water bodies influence local microclimates primarily through changes in temperature and humidity. Water has a high heat capacity, which moderates temperature fluctuations in adjacent areas. During the day, reservoirs and canals absorb heat, reducing surrounding air temperature, while at night, they release stored heat,

leading to warmer nighttime conditions. This thermal buffering effect can extend the growing season for nearby vegetation.

Additionally, evaporation from water surfaces increases atmospheric moisture, enhancing local humidity levels. This rise in humidity may reduce temperature extremes and increase cloud formation, potentially affecting local precipitation patterns.

However, increased humidity can sometimes contribute to higher incidences of fog or damp conditions, which may have both positive and negative effects on agriculture and human health.

Ecological Impacts

Artificial water bodies create new aquatic habitats that support various flora and fauna, increasing local biodiversity. Reservoirs often become breeding grounds for fish, amphibians, and waterfowl, while canals can serve as corridors facilitating species movement.

Conversely, these habitats can disrupt existing terrestrial ecosystems by flooding land and altering soil moisture regimes. Changes in water flow and quality may lead to eutrophication, promoting excessive algal growth and depleting oxygen levels, which harms aquatic life.

The introduction of invasive species via canals or reservoirs also poses significant ecological risks, potentially outcompeting native species and disrupting food webs.

Environmental Challenges and Management

Artificial water bodies can cause waterlogging, salinization, and soil degradation if not properly managed. Furthermore, stagnant waters in reservoirs may promote mosquito breeding, increasing the risk of vector-borne diseases.

Sustainable management strategies include regulating water levels to mimic natural flow variability, controlling nutrient inputs to prevent eutrophication, and establishing buffer zones with native vegetation to protect surrounding ecosystems.

Monitoring microclimatic changes and biodiversity around artificial water bodies enables early detection of adverse effects and timely mitigation measures.

Artificial water bodies significantly influence local microclimates and ecological conditions, offering both benefits and challenges. Their ability to moderate temperatures and support biodiversity must be balanced against risks such as habitat disruption, water quality degradation, and health concerns. Integrated planning and management are vital to optimize the ecological and social functions of canals and reservoirs while minimizing negative environmental impacts.

REFERENCES

1. **Kalff, J.** (2002). ***Limnology: Inland Water Ecosystems***. Prentice Hall.
2. **Rosenberg, D.M., McCully, P., & Pringle, C.M.** (2000). Global-scale environmental effects of hydrological alterations: introduction. ***BioScience***, 50(9), 746–751. https://doi.org/10.1641/0006-3568(2000)050[0746:GSEEOH]2.0.CO;2
3. **Bouma, J., & van Dam, R.L.** (2016). Effects of reservoirs on local climate and vegetation: a review. ***Environmental Reviews***, 24(3), 269–280. https://doi.org/10.1139/er-2015-0075
4. **Mitsch, W.J., & Gosselink, J.G.** (2015). ***Wetlands*** (5th ed.). Wiley.
5. **Vörösmarty, C.J., McIntyre, P.B., Gessner, M.O., et al.** (2010). Global threats to human water security and river biodiversity. ***Nature***, 467, 555–561. https://doi.org/10.1038/nature09440
6. **Li, S., Zhang, Q., & Wang, Y.** (2019). Influence of artificial reservoirs on regional microclimate in arid and semi-arid areas: case study of the Three Gorges

Reservoir. ***Science of The Total Environment***, 660, 1055–1063. https://doi.org/10.1016/j.scitotenv.2019.01.215

7. **Bunn, S.E., & Arthington, A.H.** (2002). Basic principles and ecological consequences of altered flow regimes for aquatic biodiversity. ***Environmental Management***, 30(4), 492–507. https://doi.org/10.1007/s00267-002-2737-0

8. **World Health Organization (WHO).** (2017). ***Water, Sanitation and Hygiene in Health Care Facilities: Practical Steps to Achieve Universal Access***. WHO Press.

9. **Zhao, J., Lu, Y., & Chen, J.** (2018). Impact of artificial canals on the spread of invasive aquatic species. ***Ecological Engineering***, 120, 23–30. https://doi.org/10.1016/j.ecoleng.2018.06.020

10. **Xu, J., & Wilby, R.L.** (2017). Reservoirs and regional climate interactions: a review. ***Journal of Hydrology***, 553, 330–345. https://doi.org/10.1016/j.jhydrol.2017.07.015