

# Fish Diversity and Climate Change: A Review

INDRANI DUBEY<sup>1</sup>, SUNITA ARYA<sup>2</sup>

<sup>1</sup> Department of Zoology, DBS College Kanpur (U.P.)

<sup>2</sup> Department of Zoology, DG College Kanpur

**Abstract-** *The response of biodiversity to climate change has become an extremely active field of research. Predictions play an important role in alerting scientists and decision makers to potential future risks, provide a means to bolster attribution of biological changes to climate change and can support the development of proactive strategies to reduce climate change impacts on biodiversity. Climate change' caused by anthropogenic activities is going to cause a major impact on water, forest, biodiversity, agricultural productivity and human health. However, the predicted impacts are going to be wildly different in different parts of the world, on different sectors and in different time frames.*

**Indexed Terms-** *Fish biodiversity, Conservation, Climate change.*

## I. INTRODUCTION

Biodiversity includes assemblage of plants, animals and micro-organisms; their genetic variability expressed in varieties and populations; their habitats, ecosystems and natural areas, the mosaic of which gives richness to the natural environment. Biodiversity or biological resources provide food, clothing, housing, medicine and spiritual nourishment to human beings. Apart from the rich flora, having 7% of the 89,500 animal species, found in the world (Prakash, 2021; Verma, 2021a). The loss to Indian biodiversity is mainly from habitat destruction, over-harvesting, pollution and inappropriate introduction of exotic plants and animals (Prakash, 2016, Kumar and Verma, 2017). The biodiversity has different levels and values. The genetic diversity acts as a buffer for biodiversity (Verma, 2017). The biodiversity helps in maintaining the ecological balance. There is a necessity of ecological balance for widespread biodiversity (Ashok 2017) and the ecological balance is an indispensable need for

human survival (Verma 2018). The climate change has a huge impact on biodiversity and farmers' practices (Mandal and Singh, 2020; Arya, 2021; Verma, 2021b).

The study on biodiversity could help shield water ways against nitrogen pollution. Study was carried out that showed how streams with more species are better at removing excess nutrients from water. Mopping up nitrogen compounds a major cause of water pollution released from agricultural fertilizers and waste, human sewage, and fossils, fuel burning is an important goal for environment policy. Biodiversity may help to better natural ecosystem against the Ecological impact of nutrient pollution. Excessive nutrient loading of water bodies is a leading cause of water pollution worldwide and controlling nutrient level in water sheds is a primary objective of most environmental policy. Over the past two decades, different research has shown that Ecosystem with more species are more efficient are removing nutrients from soil and water that are Ecosystem with fewer species. Conservation of biodiversity a useful tool for managing clean water and environment. Water is an Ecosystem service well-functioning Ecosystem- Forest, grassland, Soli, Rivers, lakes, wetlands and Costal water- Provide services that influence the availability of water and its quality. These services are also vital to meet water management goals such as water storage and flow regulation filtering and flood and drought protection, among- others these ecosystem services are impact by water and land management decisions and in turn influence water availability and quality.

The word 'climate' refers to the long-term weather patterns within a defined region including temperature, humidity, rainfalls and wind amount. Weather refers to daily or weekly changes in the atmosphere, while climate is generally discussed, in terms of years, decades, centuries, and millennia. Today, the commonly used term 'climate change' represents any change in climate over time, whether

due to natural causes and/or as a result of human activities. Climate change refers to significant and long-term changes to a region's climate. These changes can occur over a few decades, or millions of years. Climate change alters entire ecosystems along with all the living organisms that live there. As climate has changed throughout Earth's history, all living creatures have had to adapt, move, or die out. When these changes happen gradually, ecosystems and species are able to evolve together. A gradual change also gives species the opportunity to adapt to new conditions. When these changes happen very quickly, then the species try to adapt quickly in a suitable location. Climate change will provide new ways for invasive species to encroach on new territory.

Climate change is also a day-to-day phenomenon but it should best be referred to as climate variability. Climate change is the change of climate over a longer period of time ranging from decades to centuries caused both by natural and human-induced changes (Prakash and Srivastava, 2019). According to UNFCCC (United Nations Framework Convention on Climate Change) climate change is a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability, observed over comparable time periods. Thus, UNFCCC uses the term 'climate change' to mean only those changes that are brought about by human activities.

The aquatic organisms are susceptible to alterations in physico-chemical conditions of water i.e., due to water pollution that is mainly caused by discharge of industrial effluent. But normally an organism tries to adapt itself to these changes by changing their metabolic activities, but at higher concentrations this pollutant can cause damage to the biochemical system by affecting the organism either at the organ level, cellular level or even at the molecular level in turn causing changes in biochemical composition (Verma and Prakash, 2019; Prakash and Verma, 2020).

Fishes are the only major group of vertebrates which have a very much effect on human civilization from ancient times to date and are important for biodiversity (Verma and Prakash, 2017; Prakash and Verma, 2017; Prakash and Singh, 2020; Verma, 2020). Fish constitute half

of the total number of vertebrates in the world and live in almost all conceivable aquatic habitats. Fishes are the valuable and cheapest source of protein for economic as well as high class people so it is essential to study the distribution and availability of fish from freshwater rivers and ponds (Prakash and Yadav, 2020). Around the world approximately 22,000 fish species have been recorded out of which 2500 (11%) species are found in India (Sanjay and Prakash, 2020). The fish diversity is subjected to the changes in land and water resulting into substantial losses of fishes and remaining species may be at a risk. Fish species inhabiting in lentic fresh water bodies have to live under harsher and more variable conditions and they may be put to extra ordinary stress because of human interventions. Natural water has more stable conditions under which the fish evolve, hence enlisting biodiversity and its distribution over time and space becomes important. Until one knows the diversity and variations over time and space, it is difficult to plan conservation and the development projects related to water resources (Prakash, 2020a, b).

## CONCLUSION

There is a growing realization among decision-makers that biodiversity is not an optional bonus in human affairs, but the very foundation of our existence. Moreover, biodiversity conservation tailored to changing climatic conditions is not only necessary to help species and habitats to adapt to change, but such action is also likely to mitigate climate change (FAO, 2012). In terms of agriculture, there is a need for climate resilient farming systems. Climate literacy should be spread and a cadre of Community Climate Risk Managers should be formed in villages. The calamity of climate change should be converted into an opportunity for developing and spreading climate resilient farming techniques and systems (Swaminathan and Keshvan, 2012).

A proper management policy has been needed to be conceptualized and implemented at the earliest for sustenance and optimum utilization of the natural fishery resources of the country. Here is an immediate need of more conservation programmes in order to retain this natural freshwater heritage in India. The availability of indigenous ornamental and food fishes in natural water bodies is also perceived to be

declining rapidly which needs to be conserving at the earliest.

#### REFERENCES

- [1] Arya S. (2021). Freshwater Biodiversity and Conservation Challenges: A Review. *International Journal of Biological Innovations*. 3 (1): 74-78.
- [2] Ashok K.V. (2017). Necessity of Ecological Balance for Widespread Biodiversity. *Indian Journal of Biology*. 4(2): 158-160.
- [3] FAO (2012). *Wildlife in a changing climate*. FAO Forestry Paper 176. Eds (Edgar Kaeslin, Ian Redmond, Nigel Dudley), FAO, Rome, pp. 108.
- [4] Kumar Ajay and Verma A.K. (2017). Biodiversity loss and its Ecological impact in India. *International Journal on Biological Sciences*. 8(2): 156-160.
- [5] Mandal A.C. and Singh O.P. (2020). Climate Change and Practices of Farmers to maintain rice yield: A case study. *International Journal of Biological Innovations*. 2(1): 42-51.
- [6] Prakash S. and Srivastava S. (2019). Impact of Climate Change on Biodiversity: An Overview. *International Journal of Biological Innovations*. 1(2): 60-65. <https://doi.org/10.46505/IJBI.2019.1205>
- [7] Prakash S. and Verma A.K. (2017). IUCN Conservation Status of Fishes of Khanwari Pond of District Kaushambi (U.P.). *Proceedings of The Zoological Society of India*. 16(1): 81-84.
- [8] Prakash S. and Verma A.K. (2020). Effect of Arsenic on Serum Biochemical parameters of a fresh water cat fish, *Mystus vittatus*. *International Journal of Biological Innovations*. 2 (1): 11-19. <https://doi.org/10.46505/IJBI.2020.2102>
- [9] Prakash, S. (2020a). Conservation status of fishes reported from Semara Taal of District Siddharthnagar (U. P.), India. *International Journal of Fauna and Biological Studies*. 7(3): 21-24.
- [10] Prakash, S. (2020b). Fish diversity of Semara Taal, A Wetland of District Siddharthnagar (U. P.), India. *International Journal of Fisheries and Aquatic Research*. 5(2):7-9.
- [11] Prakash, S. (2021). Present Status of Fish diversity of Davipaton division of Uttar Pradesh, India. *International Journal of Zoological Investigations*. 7(2): 629-636.
- [12] Prakash, S. and Singh, D. (2020). Conservation status of Ichthyofauna of Baghel Taal, a wetland of district Bahraich (U.P.), India. *IRE Journals*. 3(11): 52-56.
- [13] Prakash, S. and Yadav, D.K. (2020). Ichthyofaunal diversity of Guathia Taal, a wetland of district Bahraich, U.P. (India). *International Journal of Fisheries and Aquatic Research*. 5(3): 38-41.
- [14] Prakash,S. (2016). A survey of fish fauna of Banganga River, Shohratgarh, Siddharthnagar, U.P. *International Journal of Fisheries and Aquatic Studies*. 4(6): 534-536
- [15] Sanjay, M.C. and Prakash, S. (2020). Ichthyofaunal Diversity of Rapti River flowing through Shravasti and Balrampur districts of Uttar Pradesh (India). *Bulletin of Pure and Applied Sciences*. 39A(Zoology)2:272-280.
- [16] Swaminathan M. S. and Kesavan, P. C. (2012). Agricultural Research in an Era of Climate Change. *Agric Res (January–March 2012)* 1(1):3-11.
- [17] Verma A.K. and Prakash S. (2017). Dominancy of cat fishes in Khanwari pond of district Kaushambi (U.P.). *Life Science Bulletin*. 14(1): 85-87.
- [18] Verma A. K. and Prakash S. (2019). Impact of arsenic on carbohydrate metabolism of a fresh water cat fish, *Mystus vittatus*. *International Journal on Biological Sciences*. 10 (1):17-19.
- [19] Verma A.K. (2017). Genetic Diversity as Buffer in Biodiversity. *Indian Journal of Biology*. 4(1): 61-63.

- [20] Verma A.K. (2018). Ecological Balance: An Indispensable Need for Human Survival. *Journal of Experimental Zoology, India*. 21 (1): 407-409.
- [21] Verma A.K. (2020). Conservation Status of Anamniotes reported from Balapur Pond of District Prayagraj (U.P.). *Uttar Pradesh Journal of Zoology*. 41 (6): 42-46.
- [22] Verma, A.K. (2021a). Ichthyo-faunal diversity of Alwara Lake: Threats and Conservation Status. *International Journal of Zoological Investigations*. 7(2):479-485.
- [23] Verma A.K. (2021b). Influence of climate change on balanced ecosystem, biodiversity and sustainable development: An overview. *International Journal of Biological Innovations*. 3(2):331-337.