



WATER HYACINTH: EFFECT ON COMMUNITY LIFE OF KOLLERU LAKE

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Abstract: Water hyacinth (*Eichhornia crassipes* or Gurrapu Dekka in the local language, Telugu) is one of the world's most invasive submarine plants and is known to beget significant ecological and socio-economic life. Kolleru Lake, especially in the context of increased habitat heterogeneity, structural complexity, and the nonlinear effects on ecological communities. Moreover the presence of water hyacinth has its effect on fish are largely dependent on original community composition and food- web structure. A further different and abundant epiphytic brute community may increase fish cornucopia and diversity, but a drop in phytoplankton may drop dissolved oxygen attention and planktivorous fish cornucopia, latterly affecting advanced trophic situations. A little is known about the goods of water hyacinth on waterbird communities when it spread over in large area.

Keywords- Water hyacinth, submarine plants, effect on water, effect on aquatic life

I. INTRODUCTION

Water hyacinth, *Eichhornia* (Scientific name: *Eichhornia crassipes*; Local name: Gurrapu Dekka) is a native of South America, is one of the worst aquatic weeds in the world. This was brought to India as an ornamental plant at botanical garden at Bengal in 1896 (Biswas & Calder, 1954). At present this plant has become a danger to the environment and social life. The plant species has invaded almost all water bodies of the country leaving Himachal Pradesh, Jammu and Kashmir and Mizoram. The reason may be the temperate climate of the states prevented the water hyacinth invasion. In Andhra Pradesh, especially in Kolleru fresh water lake, water hyacinth is seen in abundance and also in almost every river body of the state. For a long time, the aquatic plant was considered only as a waste and was either cleared up or left unused. "The plant is far more productive than the crops that have been carefully cultivated by man under near-ideal conditions of fertilization, irrigation, and pest control," wrote John Bunton in an article which appeared in Far Eastern Agriculture.



fig: photo of water hyacinth

Basically, Water hyacinth is considered as a weed and bad for the reasons:

- When water hyacinth increases the Sediment level increases
- Water hyacinth increases , due to evaporation water loss by 2.5 to 3 times
- It decreases Bio-diversity, and other aquatic plants have difficulty in surviving.
- Diversity of fish stocks is often affected from proliferation of water hyacinth.
- Source of breeding ground for mosquitoes and other parasites.

II. Study Area Description

The study area, Kolleru Lake, is a fresh water lake situated in the south-eastern part of India. This Lake is about 245 sq.km, administratively, the lake is found in Andhra Pradesh State of India. The absolute location of the lake extends from 16°39'00.0"N 81°13'00.0"E. and it is found at an altitude of 31m above sea level. Kolleru lake is in tropical climate zone. The temperature of surface water varies between 24°C to 32°C, the lake basin enjoys rainfall from both southwest as well as northeast monsoons. The rainfall was found to vary widely across the years. The normal rainfall in the area is 715 mm (apprx).

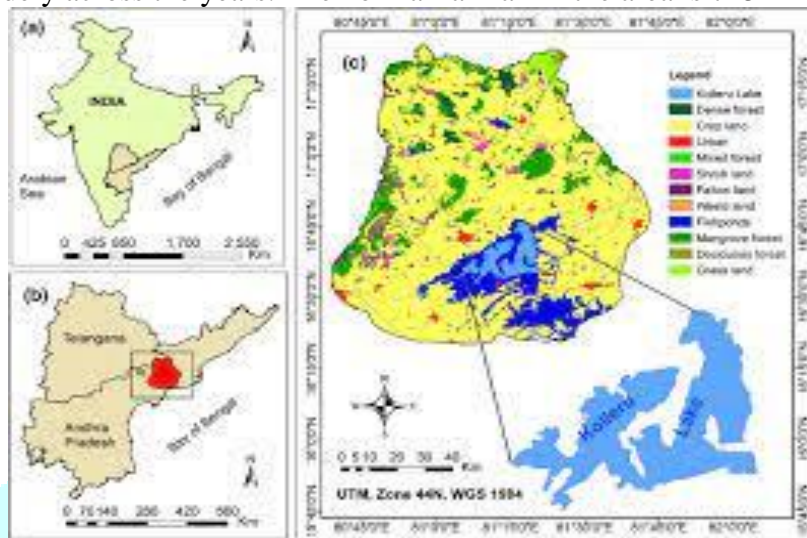


fig: lake region

III. Biodiversity of Kolleru

Kolleru basin is a home for numerous biodiversity resources. The basin delivers a comfortable place for various flora and fauna. Fish culture is well acknowledged and good sources of the region's economy. Fishes exhibit enormous diversity in their morphology, habitat they live in and biology. In India there are 2500 species of fishes out of which 930 are freshwater and 1,570 are marine. Freshwater biodiversity has declined faster than either terrestrial or marine bio-diversity over the past 30 years.



Fig. flora and fauna of the lake, bio-diversity

As a natural resource, Kolleru Lake supports the settlement and livelihoods of many people. About 2 million people live near Kolleru and its catchment. The Lake supports various livelihoods though agriculture is the dominant. Among the different livelihood strategies, fishing is the major livelihood of the surrounding people. Livelihoods are influenced by locations and resources available in the area that determine opportunities available to the people.

IV. Impact on Kolleru

Kolleru Lake in Andhra Pradesh, India, is one of the largest freshwater lakes in the country and is known for its rich biodiversity. However, it has faced environmental challenges, particularly the invasion of water hyacinth, an aquatic plant that grows rapidly and forms dense mats on the water surface. The presence of water hyacinth in Kolleru Lake can have several effects on the community life and the ecosystem in the region.

However, the negative effects on phytoplankton availability could potentially disrupt the trophic dynamics of the ecosystem. Phytoplankton forms the base of the aquatic food chain, and a reduction in its availability may impact herbivorous and planktivorous species, including fish. The consequences for fish populations can be complex, with both positive and negative effects depending on the original community composition and food-web structure.

Here are some potential impacts:

1. Ecological Impact:

- **Habitat Disruption:** Water hyacinth can form dense mats that cover large areas of the lake's surface, blocking sunlight and reducing oxygen levels in the water. This can have detrimental effects on aquatic plants, fish, and other organisms that rely on sunlight and oxygen.
- **Biodiversity Loss:** The dense growth of water hyacinth can outcompete native aquatic plants, leading to a decline in biodiversity. The reduced availability of open water areas may also affect fish populations and other aquatic species.
- **Altered Nutrient Cycling:** Water hyacinth extracts nutrients from the water, potentially leading to imbalances in nutrient cycling within the lake ecosystem. This may affect the growth of other plants and algae and further impact the overall ecosystem health.

2. Economic Impact:

- **Fisheries:** The presence of water hyacinth can hinder fishing activities by reducing access to open water areas. It may also impact the abundance and distribution of fish species, affecting the livelihoods of local fishermen and the fishing industry.
- **Agriculture:** Water hyacinth can interfere with irrigation systems, affecting agricultural practices in the surrounding areas. The plant's rapid growth and spread may clog water channels, impacting the availability of water for agricultural activities.

3. Social Impact:

- **Livelihoods:** Communities dependent on fishing and agriculture around Kolleru Lake may experience a decline in livelihoods due to the ecological and economic impacts of water hyacinth. This can lead to increased poverty and a decline in the overall quality of life.
- **Access to Water:** The dense mats of water hyacinth may hinder the traditional use of the lake for domestic purposes, such as bathing and washing, affecting the daily lives of local residents.

V. Removal Management

It's extremely difficult to remove Water hyacinth once established. To minimise economic costs and ecological damage the management efforts should be established with common sense. The management of water hyacinth focuses on techniques to remove the weed; however, little has been done to assess the full extent of ecological changes according to the literature survey. There are very few studies that report the ecological conditions. One of the methods to reduce/eliminate water hyacinth, one must adopt bioremediation.

Bioremediation

Bioremediation is the cheapest and most sustainable control method for weed eradication as chemical and mechanical control measures are costly and hampered by reinfestation from its long-lived seeds. Bioremediation would serve as a good system for locations where water hyacinth continues to grow at greater than acceptable levels. It has proved to be an acceptable control system in several instances in developing countries such as Papua New Guinea, Sudan and Benin. It is also observed that, various natural adversaries of water hyacinth reported from different corners of the world. Using presently available agents, it usually reduces the extent of the infestation, climate, water quality, and other control options. In conjunction with other available tools like herbicides application, physical junk removal, manipulation of overflows, and reductions of nutrient input is anticipated to increase the pace of eradication of the weed from the submarine ecosystem.

VI. Conclusion

It's worth noting that managing water hyacinth in aquatic ecosystems requires a balanced approach that considers both the positive and negative ecological impacts. Integrated control measures that address the spread of water hyacinth while minimizing negative consequences on native biodiversity and ecosystem services are crucial. Ongoing research and monitoring are essential to understand the evolving dynamics of the ecosystem and inform effective management strategies.

The present efforts to manage and control the spread of water hyacinth in Kolleru Lake involves a combination of mechanical, chemical, and natural control measures. It's essential for local communities, government authorities, and environmental organizations to work together to address the challenges posed by water hyacinth and restore the ecological balance of the lake. So, it's advisable to check for the rearmost information on the current state of Kolleru Lake and ongoing conservation efforts.

References

- [1] <https://asrlms.assam.gov.in/frontimpotentdata/water-hyacinth>.
- [2] Kar, D. 2003. Fishes of Barak drainage, Mizoram and Tripura, pp. 203-211. In: Kumar, A., Bohra, C. and Singh, L. K. (Eds). Environment, Pollution and Management. APH Publishing Corporation, New Delhi, p. 604.
- [3] Jenkins, M. 2003. Prospects of Biodiversity. Science, 302: 1175-117 Biswas, K. and Calder, C.C. (1954). Handbook of common water and Marsh Plants in India and Burma. Health Bull, 24 pp.
- [4] Mehra, A., Farago, M. E. and Banerjee, D. K. (1999). The water hyacinth: an environmental friend or pest? A review. Resource, Environment and Biotechnology, 2: 255–281. Teherruzan, Q. and Kushani, D. P. (1989).
- [5] Evaluation of some aquatic macrophytes cultivated in enriched water as possible source of protein and biogas. Hydrobiological Bulletin, 23: 207-212.
- [6] Tiwari, S., Dixit, S. and Verma, N. (2007). An Effective Means of Biofiltration of Heavy Metal Contaminated Water Bodies Using Aquatic Weed Eichhornia crassipes. Environmental Monitoring and Assessment, 129: 253–256.
- [7] Vijayan, V.S., Prasad, S.N., Vijayan, L. and Muralidharan, S. (2004). Inland wetlands of India – conservation priorities. Salim Ali Centre for Ornithology and Natural History, Coimbatore.
- [8] Bhattacharyya A., Sharma, J., Shah, S. K. and Chaudhary, V. (2007). Climatic changes during the last 1800 yrs BP from Paradise Lake, Sela Pass, Arunachal Pradesh, Northeast Himalaya. Current Science, 93(7): 983-987. 2 Gogoi, R. (2007).
- [9] Conserving Deeper Beel Ramsar Site. Current Science, 93(4): 445-446. 2 Reddy, C. S., Pattanaik Chiranjibi and Murthy, M. S. R. (2007).
- [10] Assessment and monitoring of mangroves of Bhitarkanika Wildlife Sanctuary, Orissa, India using remote sensing and GIS. Current Science, 92(10): 1409-1415.
- [11] Pattanaik Chiranjibi and Reddy, C. S. (2007). Need for conservation of wetland ecosystems: A case study of Ansupa Lake (Orissa, India) using remote sensing based data. National Academy Science Letters, 30(5&6): 161-164.