



URBAN LAKES AND ITS ECOSYSTEM SERVICES: SIGNIFICANCE, THREATS AND CONSERVATION

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-----ABSTRACT-----

Urban lakes are recognized as freshwater resources in urban areas and permanently have little water flow. It strongly supports to agricultural activities, fishery and provides water for domestic purposes. Sometimes, water is treated as a public good when it is abundantly available, but due to rapid growth of urbanization, industrialization, population, and urban lifestyle put more pressure on water bodies now water is a scarce resource. Currently, water is treated as economic good. Once, the urban lakes act as freshwater resources but presently act as wastewater recipients in urban areas. Therefore this paper discusses the importance of urban lakes and its ecosystem service, the various threats to urban lakes, and conservation methods. This paper will suggest to the Government should make a proper plan for the restoration of lakes in urban areas it will help to fulfill the water demand of people in the urban areas and after restoration Government should allocate funds for the maintenance of lakes.

KEYWORDS: Urban lakes, Freshwater, Economic good, Restoration.

1. INTRODUCTION

Urban Lakes are the main source of freshwater resources and it provide enormous services such as drinking water, fishes, recharge the groundwater, provide water for irrigation, control flood in urban areas and habitats for aquatic life. Ecosystem services are the benefits to people obtain from ecosystems (Millennium Ecosystem Assessment, 2005). Ecosystem services are two types, terrestrial and aquatic ecosystems. In that, freshwater ecosystem is declining faster than other ecosystem. India is one among the 17 mega biodiversity nations and occupied 9th position in freshwater mega diverse countries in the world (Mittermeier et.al., 1997). The easily available freshwater bodies are river, lakes, and ponds. Lake is one of the importance freshwater ecosystems. It provides the various goods and services for human well-being. But in recent decades, high population growth rate, rapid urbanisation, industrialisation, improper infrastructure plan and development, encroachment leads to shrinkages of freshwater bodies; some of the urban lake are dried out and acts as domestic sewage recipient. Therefore, this research paper discuss about the significance, threats and conservation of urban lakes and its ecosystem services in sustainable manner.

2. REVIEW OF LITERATURE

Manikandan and Bhuvaneshvari (2022) study elucidated the causes and consequences of urban lakes pollution in Coimbatore city. This study adopted the focus group discussion for collected the information with fishermen, farmers and household in around the lake. The research paper reveals that fisherman are economically affected due to urban lake and pointed out the various reasons of urban lake pollution in city area and its impacts on fishermen, farmer and household. The paper suggested to corporation should take necessary actions for make awareness to people about the economic value of lake.

Sugam et. al (2018) analysed the status of traditional water bodies in meerut district. In this study, 120 ponds were randomly selected and test water quality. The study detail discussed about the major reasons for degradation of traditional waterbodies and mentioned the essential of digitalise, monitor, control and prevention of pollution. The study suggested the serious steps are required for preserve the traditional waterbodies.

Vani and kamaraju (2016) discussed the impact of urbanisation on lakes in Hyderabad. The study explained the importance of ecological footprint, causes of lake degradation in urban areas. The lake pollution



was affected the basic urban needs like domestic water supply, recreational activities and irrigation. The research suggested to preservation of the water bodies in urban areas.

3. METHODOLOGY

This paper is descriptive in nature. The study labels the importance of urban lakes and its ecosystem services and enumerates the threats for urban lakes due to human intervention and also this paper discusses the various conservation method for restore the freshwater ecosystems. For this paper secondary data was collected from State Public Work Department, Jal Shakti reports, Central Public Health and Environmental Engineering Organization report and from various newspapers.

4. SIGNIFICANCE OF URBAN LAKE AND ITS ECOSYSTEM SERVICES

Urban Lakes are an intrinsic part of freshwater ecosystem services. It provides various direct use and indirect use values and support to human well-being. It was categories into four types, such as provisioning, regulating, cultural and supporting services (Millennium Ecosystem Assessment, 2005). The provisioning services provides food in form of fish, water purification, medical plants, fiber. The regulating services are recharge the groundwater, local climate and air quality regulation, carbon sequestration and control flood. The cultural services are recreational, tourism, aesthetic and education then supporting services are habitat for various species and biodiversity. The provisioning services are direct use values of lake and indirect use values are regulating, cultural and supporting services.

Fishery

Urban lakes are host for wide variety of flora and fauna. The lakes act as freshwater ways connecting path in and around city areas and support to fisherman. Lake is a habitat for more variety of fishes and it contains rich protein. In urban areas, fishermen are economically depend on the lakes for their livelihood. They are protector of lakes ecosystem.

Control the Flood and fulfill the water demand

During the ancient times, lakes were constructed around the river bed area to control the flood and stored the excess rainfall for irrigation and domestic purposes. The collecting and storing rainwater is one of the important functions of waterbodies. Urban lakes are act as freshwater resources and it was traditionally served the freshwater for drinking purpose, agricultural activities, and other domestic purposes and also fulfills the water requirement of industries.

Water purification and recharging the Groundwater

Urban lakes are one of the surface water bodies. It helps to filtering the waste and sediment the excess nutrients and also recharging the groundwater. The groundwater used for drinking, irrigation and other domestic purposes. Urban lakes are being used for treated the contaminated water from sewer systems, urban storm water runoff and direct disposal of household wastewater.

Support to recreation activities

Urban lakes are providing open and green space for urban people. It supports to recreation activities like boating, swimming, fishing, birds watching and cultural activities. The economic benefits of urban lakes can be find out through the research on recreational activities, fishing and so on. The existence of urban lakes are plays a significant role in recreation benefits to the people, in terms of place for relaxation, entertainment and indirectly reduce the health cost and stress via walking, jogging, playing and relaxing, etc.

Economic value of urban lakes

Fishery, Transport, energy, lotus, medicinal plants, fuel wood and water used for domestic purpose are considered as use value of urban lakes. All these goods and services are measured in terms of money or Market value. Some of the non-use values also measured with help of environmental economic valuation methods such as travel cost method, contingent value, cost and benefits analysis, etc.

5. THREATS FOR URBAN LAKE AND ITS ECOSYSTEMS

The degradation of Ecosystem services causes significant harms to human well-being (Millennium Ecosystem Assessment, 2005). High population growth, Anthropogenic activities, migration, Urbanisation, Industrial activities, illegal discharge of industrial wastewater, encroachments and blockages, dumping of solid



waste and plastic waste, lack of maintenance, lack of information, market failure are main threaten to urban lakes.

High population growth increases the water demand for consumption, after water consumption huge amount wastewater generated. Due to lack of wastewater treatment plant and negative externality, domestic wastewater directly disposes into waterbodies and industries are illegally discharge the effluents into waterbodies. The urban lakes are able to filter out sediment, excess nutrient and toxic chemicals up to their carrying capacities. After that, reaction in form of algal bloom, evasion of water hyacinth and odour. It affects the freshwater ecosystems and creates water scarcity. Urban people are dumping their solid waste and plastic waste into Lake bund areas and using as garbage dumping place. The economically weaker section people are encroached the lake bund areas and it creates as slums for their livelihood. Lack of information and awareness about the uses and non-use value of lake among the users and people. So, they continuously polluted the lakes. The waterbodies are considered as public good but, due to over exploitation, fails to assess the true value derived from waterbodies leads to market failures these are main causes for threats to urban lakes.

6. IMPACTS DUE TO LOSS OF URBAN LAKES

Urban Lakes are mostly located vicinity to city areas. City areas are under the infrastructure development process and pressure from residential, industries and commercial facilities development. The Government and people are concentrating on infrastructure development and economic growth of city and ignore the environmental quality and also neglected to the environmental protection. Ignorance of environmental quality is rise huge health cost to society in form of air pollution, water pollution etc.

Water pollution and water scarcity

Human activities are affected the surface water. The Central pollution control board estimated that 75-80 percent of surface water polluted by domestic sewage and untreated sewage directly dispose into freshwater bodies like rivers, lakes and ponds. Freshwater bodies pollution leads to water scarcity and people consume unsafe drinking. It creates health cost due to water borne diseases such as cholera and diarrhea. According to UNICEF and FAO report shows that, inadequate water supply and poor sanitation kills 6,00,000 children under age of five in each year. The water in India: Situation and Prospects report, estimated that annually 37.7 million of people are affected by water-borne diseases in India and 1.5 million children die due to diarrhoea (Basu, 2013).

Groundwater depletion

Dryness, over exploitation and excess pollution of waterbodies leads to groundwater depletion. According to Ministry of Jal Shakti report, that 80 percent of people depend on the groundwater for domestic purposes. But it contains exceeding limit of hazardous metals groundwater becoming poison and 80 percent of population are consuming poison in form of groundwater (India Today, 2022)

Economic impact on Fisherman

Pollution and degradation of urban lakes are highly affected the fisherman economically. Because, fishing is the main employment opportunity for their livelihood but due to lake pollution, declining the fishing, they are face huge economic loss in fishing activities. It also decline the use value and non – use value of lakes ecosystem services.

7. CONSERVATION METHODS

In urban lake conservation, first remove the encroachment and blockages in inlets and outlets of lakes and implementation of wastewater treatment plants was needed to filter the wastewater before discharge into lakes. The planting plants and trees around the lakes bunds, it helps to strengthen soil and control the soil erosion, regular cleaning and maintenance support to sustain the lake restoration process. The Government should adopt the proper conservation methods for sustaining Lake ecosystem services for present and future generation.

8. CONCLUSION

Urban lakes are one of important freshwater bodies and water easily available for consumption of but, ignorance and lack of maintenance urban lifestyle and improper urban planning, put more pressure on urban lakes and its ecosystem services. Urban lake restoration is one of the best solutions to overcome the water pollution and water scarcity in urban areas. Government should take measures for the lake restoration process and lake conservation will support to users and people living around the lakes. This paper suggested the public-



private partnership (PPP) model was applied in the lake restoration process and maintenance. Because, without local people's support, Government actions to restoration of the lakes are not achievable and NGOs make awareness through their volunteer actions to protect and restore the lakes. Therefore, the public-private partnership model is well applicable for lake restoration and maintenance. And also the PPP model will help to conserve the urban lakes in a sustainable manner.

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