

STUDY OF POND STATUS IN INDIA : A REVIEWV.K.YADAV¹, *SONAM SHARMA¹, A.K.SRIVASTAVA² AND P.K.KHARE³¹Department of Botany,²Department of Zoology,

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Received : 28.01.2017; **Accepted** : 26.03.2017**ABSTRACT**

Ponds are an important fresh water critical ecosystem for plants and animals providing goods and services including food, fodder, fish, irrigation, hydrological cycle, shelter, medicine, culture, aesthetic and recreation. Ponds cover less than 2 percent of world's land surface. Ponds are important source of fresh water for human use. These are threatened by urbanization, industrialization, over exploitation, fragmentation, habitat destruction, pollution, illegal capturing of land and climate changes. These above factors have been destroying ponds very rapidly putting them in danger of extinction of a great number of local biodiversity. It is necessary to formulate a correct conservation strategy for pond restoration in order to meet the growing needs of fresh water by increasing the human population. Some measures have been compiled and proposed in the present review.

Figure : 00

References : 57

Table : 00

KEY WORDS : Biodiversity, Carbon sequestration, Ponds, Value.

Introduction

For the existence of life on earth a continuous and adequate source of water is required. The fresh water primarily comes from the ocean by precipitation as mist, rain and snow. With the growing population, demands for water is also increasing. Our body contains approximately 70% water, which clearly establishes its importance. The ponds are fresh water inland bodies with standing or slow moving water. Ponds cover less than 2 percent of the world land surface. Ponds are vital wetlands located in and around human habitation as they are generally semi natural ecosystem constructed by man in landscape suitable for water stagnation. Ponds are ecologically different from larger water bodies, describing them as lakes where deep aphotic zone was missing²⁴. It has been defined as a body of standing water that is smaller than the lakes². Pond is a water body with a maximum depth of not more than 8 m. offering water plants, the potential to colonise almost the entire

area of the pond⁴². Pond is a water bodies between 1 m² and 2 ha in area which may be permanent or seasonal, including man-made and natural water bodies⁶. Ponds has been defined as a body of standing surface water either natural or man-made which is quite smaller than lakes¹⁹. Ponds are the important source of fresh water for human use and inhabited by a diverse site of organisms. The ecosystem services rendered by pond are innumerable including both tangible and non-tangible ones. Although the ponds are small, they maintain a connected landscape by constituting a series of vital stepping stones that run through the landscape as well as presenting a range of benefits to the surrounding ecosystem³⁷. Besides activity as the source of fresh water they provide valuable services for human being such as fish, fodder, hydrological cycle, water security sector, lower the ambient temperature, global biogeochemical cycle, high regional aquatic biodiversity and cultural services that increases the quality of human life

through recreation, religion, spiritual, and aesthetic activities^{11,13,37,45,49,53,54,57}.

Despite their ecological importance, ponds face the degradation and loss of ecosystems due to changes in land uses, urbanization, human impact on biogeochemical cycle pollution, invasive species that displace endemic species, poor management, over exploitation and climatic change^{6,34,41}. This loss results adversely on key function performed by ponds such as ecosystem goods and services. One of the major causes of pond loss in India is illegal capturing of land, climatic changes and uncontrolled rainfall^{1,36,57}. Some of these factors which lead to significant alteration in pond ecosystem in our country are growing at alarming rate³⁴.

This present review is presented with the view to explore strategies for planning with the substantial development of these ecosystem providing lot of support to rich biodiversity for the benefits of the society.

Origin, distribution and state of pond

Ponds are diverse in origin, and can be created by a wide range of natural process such as glaciations, land subsidence, revise action, tree fall or man made. These occur in all bio geographical region including arid and semi-arid areas²⁵. They are often found in clusters, forming a network of patches or pondscape⁷. These are particularly common on flood plain, but pond can also occur nearby high densities in other types of landscapes, such as high altitude zones of Alps⁴⁵. It has been estimated that there are 277400000 ponds which are less than 1 hectare in size, plus 24120000 water bodies ranging from 1 to 10 hectare thus representing 30% of global standing water by surface area¹⁷. In India, its annual rainfall of over 1200 mm, varied topography and elevated regions support and sustain diverse and unique pond habitat. About 122370 man made ponds are found in our country which may occupy 1310443 hectare area³⁹.

Value of pond

Ponds cover relatively very small population of total land surface but provide livelihood for millions of people who live around them and provide many ecosystem goods and services which the human cannot obtain otherwise. Ponds are ecologically sensitive, adapting vital eco system because they change aquifer, conserve moisture habitat to biodiversity and fish for human

being⁵⁵. Ponds are used as experimental systems test ecological theories¹⁵. They perform three major functions as hydrological, biogeochemical and ecological. Hydrological functions include flood water detention, ground water recharge, ground water discharge and sediments retention whereas biological functions include processes such as nutrient export, storage of nutrient in the soil organic matter adsorption of nitrogen as ammonium, adsorption and precipitation of phosphorus in soil, In situ carbon retention etc. The process included in the ecological function are ecosystem maintenance and food web support to the biodiversity. Provision for the habitat structural diversity and microsites for the various group of biota-mammals, fish, amphibians, reptiles and macro invertebrates – is a major process. The process of food web support include biomass production and its import /export via different physical and biological process⁴³. These include biodiversity paleoecology, archaeology, ground water change, purification of water sediments trapes, food, wild life habitat, recycle of nutrients, aesthetic, recreation and education to society^{8,12,13,35,43,46}.

Carbon sequestration of pond

An estimate showed that farm pond may globally squinter as much carbon as the ocean¹⁸. Ponds are fresh water resources contain 12% of the global carbon pool playing important role in the global cycle¹⁶. It has been estimated that in total ponds have more surface area than the large lakes and they also store more carbon than the lakes³⁷. A single 500m² pond could sequester 1000 kg of carbon as early as that is produced by car, during the same period¹². These water bodies may be more heterotrophic than the large ecosystem, processing considerable quantities of terrestrial or external carbon. Ponds tend to have low oxygen concentration than large water bodies, which enhance their carbon sequestration capacity³⁴.

Biodiversity of pond

For the survival of human being, biodiversity is essential for well beings, function and stability of the ecosystem⁴⁸. Studies on biodiversity in relation to ecosystem have revealed that species diversity, makes enormous productivity and stability of ecosystem⁴⁰. The value of biological diversity and importance of associated ecosystem services have been closely lived to the human well being³⁶. Fresh water biodiversity in particular provides broad variety of valuable goods and services for human societies,

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some of them are irreplaceable. Freshwater biodiversity is a over-riding conservation priority during the international decade of action-water for life from 2005 to 2015²⁰.

Ponds play a vital role for the survival of biodiversity, hot spots, as refuges for both terrestrial and aquatic organisms and as stopping stone habitats²³ and also recognized as important for the maintenance of biodiversity to support more species as compared to the lakes, streams, ditches and rivers^{14,22,45}. Ponds support a large number of biodiversity and biota represent almost all taxonomy of recognized fresh water taxa^{5,44,52}. The ponds have wide range of endangered and unique species including phytoplankton, amphibians, aquatic medicinal plants and animals^{4,29,47,53}. Phytoplankton are the primary producers forming the first trophic level in the food chain. Many phytoplanktonic species served as bio indicator^{31,50}. In aquatic ecosystem zooplankton play a critical role not only as the primary consumer but also they themselves serve as source of food for higher organism. Zooplankton provide the food for fishes and can be used as an indicator of trophic status of any aquatic body⁵². Pond network are the critical part of the habitat of amphibians, fish on river flood plains, many wet land plant species, wet land mammals, and avian fauna that cover a range over large areas³³. Ponds not only enhance biodiversity of aquatic organisms, but also terrestrial organisms that directly depend on aquatic ecosystem. Ponds are common landscape elements which play important role in global process of biosphere and preservation of biodiversity³⁷. Researches have ascertained that ponds are important biodiversity hotspots both in relation to species composition and biological traits, and they play significant role in terms of providing ecosystem services^{12,19,54}.

Threats to ponds

Ponds ecosystem have significant ecological function and recognized social and economic uses. These are threatened by a number of human activities, of which the most important include, increasing human population, land use pattern, urbanization, over exploitation, improper use of resources causing negative impact on wild life members, nutrient loading, illegal capturing, climatic changes and invasion of exotic species^{1,9,36,51}. The degradation of ecosystem and biodiversity causes decline in their ability to provide

resilience to the biosphere. This leads to biotic communities and human health to suffer¹⁰. In our country where mean temperature and frequency occurrence of intensive rainfall event has increased while the number of rainy days and total annual amount of precipitation has decreased due to increased concentration of greenhouse gases³. Decreased precipitation will exacerbate problems associated with already growing demands for water and hence alter the fresh water flows of ponds²¹. Whereas rise in temperature can aggravate the problem of eutrophication, leading to algal bloom, fish kill and dead zone in the surface water²⁷. These threats also should be added at regional scale to drastic elimination of the number of ponds and reduction in the connectivity between them^{26,32,45}. In highly populated regions, the human activities can modify the hydrological condition of the pond which have direct impact on the biotic response in the water bodies^{28,41}. The artificial feeding of water fowl is also more likely to damage the ponds than longer water bodies³³. The effect of global climate change on dragon flies, amphibians, fresh water reptiles were studied by various workers³⁰. Human induced development activities can deteriorate ponds value and quality due to accumulation of toxic chemicals and sedimentation rendering the use of ponds ineffective and risky³⁸.

Conclusion

There is urgent need to protect, consolidate and increase the pond resource in India. Doing so is an achievable goal, which could be realized with relatively few resources and with many benefits for the society. Furthermore, the scientific basis for the management and conservation of pond is currently weak as compared to the information available for other than fresh water bodies. Present state of knowledge of pond ecology is not sufficient to stop the decline of biodiversity. There is a need to understand society for the purpose of protecting the nature and biodiversity management which means dealing with social process and dynamics.

It is experienced that ponds in a stress of biotic pressure are gradually transforming into eutrophication stage. Effective measures are being taken internationally and nationally by large number of developed and developing countries to form strategies for better future. A good initiative has been undertaken by U.P. Government, which has allocated a fund for development of ponds in the state and the work is in progress making restoration

of lost ponds and extension of ponds etc. to combat with the present situations, the awareness programmes to educate the public for the importance of ponds for their goods and services to the masses, should be done. The role of ponds

in the country side is indispensable hence the involvement of public, NGO-s for better healthy environment and ecological system be accessed and implemented accordingly.

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