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ECOLOGICAL STATUS AND PERFORMANCE THROUGH POND ECOSYSTEM WITH PERSPECTIVES FOR FUTURE CONSERVATION

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ABSTRACT

Ponds perform diverse roles within the biosphere as an integral component of the hydrological system. However, studies on pond ecosystems are often neglected due to its present aquaculture potential. There are only very limited research work and no review on pond ecology in India. There is lack of government initiative on pond conservation in Indian context, therefore, an attempt has been made in this review paper to evaluate the ecological status and ecosystem functioning of ponds affected with pollution and encroachment with perspectives of conservation in future.

INTRODUCTION

The ponds are significant, as it prevail ecosystem services that play major role in our life. However, it is a indisputable fact that ponds are relevant resource to outcome global issue, but are ignored in nearly all important processes like carbon processing and transport. The ponds are component of the environment and also the interacting network of metabolically active sites (Downing, 2010). The estimate suggests that ponds occupy over 90% of the worldwide water resources (Cereghino et al, 2014). The ponds were discussed for sustainable

solutions to major problems of global climate change, such as, nutrient retention, rainfall interception, and carbon sequestration provided through ponds. This signifies ponds as small wetland features with its substantial ecological roles and landscape values.

Ponds are a crucial freshwater resource which play critical role in maintaining biodiversity, but seriously susceptible to degradation (Keeble et al, 2009). The ponds management can beneficiary to the biodiversity, pollution alleviation, flood relief

and global climate change. Moreover, the pond's ecosystem connects directly with the community people. Presently ponds are increasingly arise as threatened freshwater habitat (EPCN, 2008). Proper pond water management can mitigate climate change impact; provide water for population through recharge aquifers and capture heavy rainfall event (EPCN, 2008). The active processes in ponds have global significance and therefore their role and contribution in global ecosystem processes should be emphasized (Downing, 2006).

There is no review paper on ecological status and ecosystem services related with small water reservoirs like ponds initiated problems about their current status in India. There a preliminary attempt have tried to compile the fragmented reports on ponds to clarify their present status and ecosystem services with certain measures for perspective conservation of this important aquatic ecosystem.

Ponds as instruments for water security: Ponds are a serious asset which provides vast opportunities in water security sector (EPCN, 2008). The global climate change is probably to amplify rainfall variability in all sites with scarcity or maximum rainfall (McCartney and Smakhtin, 2010).

This change in rainfall pattern will recharge all freshwater resources and groundwater in which ponds are also possible water storage options for water security through storage of vital small volumes and being increasingly appreciated as a major contributor to the event of local human and livestock populations. The similar is case in urban area as special part urban water resources necessitate their proper sustainable management (Ray and Majumdar, 2005). The pond network can significantly reduce water loss by rainfall water access prior to groundwater storage (Cereghino et al, 2014). Thus ponds are essential receptors for harvesting rainwater and in maintaining groundwater levels (Ray and Majumdar, 2005).

Ponds as biodiversity hotspots: Pond harbors nutrients and preserve biodiversity through the global processes of biosphere (Miracle et al, 2010). The ponds are important in supporting biodiversity like other freshwater resources (Science for

Environment Policy, 2008) as special habitat for a diverse range of aquatic species (Fairchild et al, 2005). Ponds located even in close proximity to every other display quite different hydrologic behavior and different environment related to each pond (Lee et al, 2015). This can be because small water bodies, like ponds, are more easily formed during a kind of landscapes. Local conditions which include geology, altitude and land cover of the border area greatly influence characteristics of the ponds. Thus, ponds tend to indicate different characteristics during a region, whether or not they're relatively near one another (Science for Environment Policy, 2008).

The previous research indicating special ecological features in ponds than other freshwater systems evidenced through more aquatic insects than rivers and interestingly represents regional diversity (Biggs et al, 2005) provide shelter to several type fish species. There both individual site pond networks provide biodiversity as provide also shelter to amphibians, fishes, plant species, avian and small mammals (Keeble et al, 2009). The ponds having low catchment than other freshwater systems and confers both positive and negative aspects to their security, and, we see major degradation process with severe anthropogenic disturbances in one side but also complete protection from land derived pollutants on other side in present and next future. A pond may show combinations of three different food cycle components as algae, periphytrons and detritus plants. The presence of this wide selection of food sources is one among the explanations for the presence of an oversized number of species of animals in ponds (Dubey, 2013).

Ponds display carbon sequestration: Ponds provide sustainable solutions to problems like global climate change and management of scarce water resources (Cereghino et al, 2014). Ponds display a major role within the global carbon balance also in period of climate change (Miracle et al, 2010). The ponds are more heterotrophic than large ecosystems, processing large amounts of atmospheric carbon storage. It also hold low oxygen quantity than large water resources, which enhances their carbon sequestration capacity. There more organic carbon

invested in ponds rather than large aquatic systems (Downing, 2010).

Ponds as pollution alleviation factors: Ponds can be used as structures to manage water quality (Downing, 2006). It can remove pollutants including nitrogen, phosphorous, and sediments in upper surface to reduce the nutrient load of the next water resources

In this technique of nutrient retention, ponds are strategically located in such the simplest way to intercept water from the drainage systems before they reaches into rivers or wetlands (Cereghino et al, 2014).

Other miscellaneous services: Ponds also perform other beneficial effects such as regulating temperature and humidity referred to as microclimate regulation. Ponds may modify the rates of groundwater infiltration and evaporative loss of water (Smith et al, 2002). The action of ponds don't seem to be limited to their local and regional scales.

The ponds are also important as they contribute immensely in the atmospheric biogeochemical cycles (Miracle et al, 2010). It can be treated as model ecosystems to check scientific aspects of ecology, conservation biology, global climate change modeling and evolutionary biology (EPCN, 2008). They are available to maintain and provide link between human and forest animals (Dubey, 2013).

Measures for pond conservation

It is essential to take care of the water quality of ponds at the required level as less management practices applied in respect of other large water resources. It can provide multiple services at regional populations. The ponds are traditional structure to store rainwater in most parts of India. These work as water reservoir may be used for various activities like alternate drinking water source, bathing, washing clothes, irrigation, aquaculture and non-secular activities. However, Indian ponds are under threat to accelerating pollution rate and disappearance due to filling up and encroachment.

There is also scarce research due to consideration of small system and funding inability

contributed to dearth of fine pond researches in India. This resulted in threatened ecosystem although play substantial roles in ecological stability. It hold great necessity to research for conservation and sustainable development in future. In India, even high rainfall areas have water scarcity problem during summer months and, therefore, it may be valuable to harvesting rainwater and in maintaining local groundwater levels (Ray and Majumdar, 2005). Ponds are important to the life and prosperity of the agricultural ecosystem in India. It also store water for sustainable use in future rural and urban regions (Ray and Majumdar, 2005).

Ponds as decentralized water resources are more helpful against droughts and floods and, moreover, are less expensive water structures (India Today, 2014). It seems that a network of community ponds have lost within previous periods. Ponds can play very significant roles as sustainable water resources, in India, especially as sources of drinking water, domestic use and aquaculture.

CONCLUSION

This paper provides information on ponds in context of their conservation and management planning in India. The available studies showed threatened status due to increase in pollution rates and encroachment. There is a need of government policy to deliver the plan on the ground. There is a need to promote future research and development on ponds. There is also scope to develop water red data list (WARD) as IUCN red data list for extensive survey and development of these water reservoirs in India. There is also need of systematic analysis of ponds as optional storage options in relation to their local services and adaptation to climate change in India. It is a fact that ponds provide practical water conservation solutions.

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