



STATUS OF FRESH WATER PONDS IN THE PRESENT CLIMATIC SCENARIO

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Abstract: The freshwater has been of vital importance to living beings for sustains of life and maintaining the balance of nature. Water is the nature's most wonderful, essential and an invaluable gift of living organisms. Ponds is an area filled with water, artificial or natural, sensitive, adaptive and vital ecosystem. Ponds enhanced regional biodiversity and provide biogeochemical, hydrological, education, economy, recreation and aesthetic function. Growing development is causing threat to the existence to these important ecosystems. Climate change has created potential major threat to pond biodiversity. Existing evidence for the potential impact of climate change on pond ecosystem indicating that the interaction between direct climate change and anthropogenic pressure that is likely to define way in which biodiversity is affected. It is necessary to formulate correct measures for the conservation of pond biodiversity.

Index Terms: Water, pond, biodiversity, climate change, conservation.

I . INTRODUCTION

A fundamental of earth is abundance of water which covers about 71 % of its surface area with an average depth of 3000 meters. About 97.6% of the water existing on the earth distributed in oceans and of the 2.4 % of fresh water. Only less than 1 % is available for human consumption and other activities (Wetzel, 2001). Man utilizes water available from sources like lakes, ponds, rivers, streams, ground water, bogs and brooks etc.

Ponds are historically and ecologically important ecosystem representing around 30 % of the global surface area of standing water (Dowing et.al.2006, 2010). Ponds serve as cheap and convenient source of water for drinking, domestic, irrigation and industries. The services provided by the pond are ground water recharge, food alleviation, high local and regional aquatic biodiversity, culture, aesthetic and recreation (Chia et.al.,2009; Takaura, 2012; Cereghino, 2004; Yadav et.al. 2017). Ponds also provide an underutilized resource for teaching and training of the next generation of limnologist (Mullins and Doyle, 2019).

The present article a brief of the likely effect of climatic change upon the pond ecosystem is presented and possible achon is safeguard the pond biodiversity in the face of climate change are discussed.

II . IMPORTANCE

Ponds are shallow bodies of standing water with muddy or silty bottom allowing light to penetrate the whole water column (Caduto, 1990). Globally ponds play important role at carbon sequestration as much as carbon as the ocean and 12% of the global carbon pool play important role in global carbon cycle (Dowing et. al. 2008; 2010). Ponds play a potential role in rain water harvesting and recharge of ground water, thereby contributing to the overall maintenance of ground water level (Bhagyaleena and Gopalan, 2012). They also play an important place for people of all ages to find out about wetland wildlife and almost everybody knows

that managing an old pond or creating a replacement one for wild life (Biggs et.al. 1987). Ponds also make a crucial contribution to society through providing the ecosystem services and for the effective conservation it also ensures that these services maintained (Hill, et.al. 2018).

III. BIODIVERSITY

Biodiversity is essential for human survival and economic well-being and for the ecosystem function and stability. (Lind 2002). Ponds are harbour of high biodiversity as compared to lakes, streams, ditches and river (Davis, 2005; Oertli et.al. 2005). They play a vital role for survival of biodiversity hotspot as refuges for both terrestrial and aquatic organism and act as stepping stone habitats (EPCN, 2008; Dudegeon et.al. 2006). Ponds are ecologically important ecosystem due to they provide breeding site for amphibians, dragonflies and other invertebrate, as well as key habitat for diverse aquatic plants and animals (Beja and Alcazar 2003; Zacharias et. al. 2007; Pinto- Cruz et. al. 2011). Importance of ponds and its high regional biodiversity value for wide range of endangered species including insects, amphibians, reptiles and aquatic medicinal plants have been well established and provide essential resources for millions of people (Grillas et.al. 2004; Williams et. al. 2004; Schefer et. al. 2006; Sousa, et. al. 2016).

IV. STRESS

Amoeboid growth of human population is causing stress on the pond ecosystem and therefore the ponds are getting polluted and shrinking in their valued and extent (Bronnmark and Hansson, 2005; Mane, 2014). Further, the sedimentation and silting processes reduce water holding capacity of pond ecosystem. Anthropogenic activities introduce excess nutrients and several pollutants into the pond, thus causing alteration in pond environments (UNESCO, 2007). Eutrophication cause changes in the plant and animal life, break the food chain, detract water from natural beauty and reduce economic value (Gopal et. al. 2010).

Ponds are one of the most threatened ecosystems of the world due to urbanization, over exploitation, nutrient loading, toxic pollutants, illegal capturing, invasive species and climate change adversely affect the health of ponds and its biodiversity (Bronnmark and Hasson ,2005; Ripple et.al.,2017). The potential impact of global climate changes and associated social and economic responses as widely recognized as a major threat to biodiversity (Hulme, 2005; Sutherland et.al. 2005). The reduction of greenhouses gas emission in the international pollution agenda. However, even with the immediate and radical action, it is clear that we are commit to a period of warming and associated changes in wheatear pattern over the next 30-40 years (King, 2005; IPCC, 2007). Ponds have been largely neglected in research regarding freshwater bodies, and recently they begun to be recognized and investigated as unique ecosystem distinct from lake, streams, and rivers (Biox.et.al.2012).

V. CONCLUSION

The ponds are very useful and important ecosystem which harbour a vast majority of regional biodiversity which is declining due to anthropogenic drivers and climate change. There is urgent need of scientist and social workers to find out the measures to protect and conserve the ponds as they are economically important for human societies. Some of the suggested measures for pond conservation are educate the public regarding the services they provided to mankind for free of cost, cheque the nutrient and sewage input, phytoremediation of nutrient and heavy metals, protect against the invasive vegetation and continuous monitoring of ponds. The nature has restored the pond biodiversity during lockdown period due the threats of Corona Pandemic. Hope we will learn a lesson from the lockdown and will change our life.

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REFERENCES

- 1) Beja, P., Alcazar, R., (2003) Conservation of Mediterranean temporary ponds under agriculture an evolution using amphibians, *Biological conservation*, 114: 317-26.
- 2) Bhagyaleena, P and Gopaleen, R. (2012) Aquatic plant diversity of pond in Nenmara panchayat, Palakkad district, Kerala, India. *International Journal of scientific and research publication*. 2(8), pp.2250-3153.
- 3) Biggs, J., Walker, D., Whilfield, M., and William, P. (1987) *Pond action: Promoting the conservation of Ponds in Britain*. c/o School of Biological and Molecular Sciences, Oxford Polytechnic, Gipsy Lane, Headington, Oxford OX3 OBP, England.
- 4) Biox, D., Biggs, J., Cereghino, R., Hull, A., Kalettka, T., and Oertli, B. (2012) Pond research and management in Europe: "Small is Beautiful". *Hydrobiologia*. 698: 1-9.
- 5) Bronnmark and Hansson, L.A. (2005) Environmental issues in lake and ponds: Current state and perspectives. *Environmental Conservation*. 29: 290-307.
- 6) Bronnmark, C.; Hansson, L.A. (2005) Environmental issues in lakes and ponds: Current state and perspectives, *Environmental conservation*, 29: 290-307.
- 7) Caduto, M.J. (1990) *Pond and Brook a guide to nature in freshwater environment*, Hanover, NH: University press of New England.
- 8) Cerehino, R., Biox; D., Cauchie, H.M. Martens, K. and Oertli, B. (2014) The ecological roles of pond in a changing World. *Hydrobiologia*. 723, pp. 1-6.
- 9) Chia, A.M., Aboludu, D.S., Ladan, Z., Ankabi, O. and Kalaboms, A. (2009) The presence of *Microcystis* in aquatic ecosystem in Northern Nigeria. Zaria as a case study. *Research Journal of environmental toxic ecology*, 3: 170-178.
- 10) Davice, B. (2005) *Developing a strategic approach to the protection of aquatic biodiversity*, PhD. Thesis, Oxford Brookes University.
- 11) Dowing, J.A., (2010) Emerging Global role of small lakes and ponds: little things mean a lot. *Lamnetica*. 29-: 9-24.
- 12) Dowing, J.A., Cole, J.J., Middleburg, J.J. Striegle, R.G., Duarte, C.M., Koretelenen, P. Prairie, Y.T. and Lub, K.A. (2008) Sediments carbon burial in agriculturally eutrophic impoundment over the last century *Global biochemical cycles*, 22; 1029/2006 GB002584.
- 13) Dowing, J.A.; Praire, Y.T.; Cole, J.J.; Dwart, C.M.; Tranvik, L.J.; Striege, R.G.; MC Dowell, W.M.; Kortlainen, P.; Caraco, N.F.; Melack, J.M.; Middleburg, J.J. (2006) The global abundance and size distribution of lakes, ponds and impoundments, *Limnology and Ocenography*, 51: 2388-2397.
- 14) E.P.C.N. (2007) *Developing the pond manifesto Annales de Limnology- International Journal of Limnology*, 43(4): 221-232.
- 15) Hill, MJ, Hassall, C., Oertli, B. (2018) New policy directions for global pond conservation. *Conservation Letters*. 11: e12447. <https://doi.org/10.1111/conl.12447>.
- 16) Hujare, M.S. (2005) *Hydrobiological studies on some water reservoirs of Hatkanangale Tahsil (Maharashtra)*. Ph.D. thesis, Shivaji University, Kolhapur.
- 17) IPCC (International Panel on Climate Change ((2007) *Climate Change 2007: Synthesis report, Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on climate change [Core Writing team, Pachauri, R.K. and Reisinger, A. (eds.)]*. IPCC, Geneva, Switzerland, 104, pp. Reterived from [http:// www.ipcc. Ch/ipcc reports/ ar4-5syr.htm](http://www.ipcc.ch/ipcc reports/ ar4-5syr.htm).December, 2008.
- 18) King, D. (2006) Climate change: the science and the policy, *Journal of Applied Ecology*, 42: 779-783.
- 19) Mane, A.M. (2014) *Limnology and biodiversity of fish fauna in Karadkhed Reservoir, M.H. India*. South Asian Academic Research Journal 4(12): 108-113.
- 20) Mullins, M.L. and Doyle, R.D. (2019) Big things come in small packages: why limnologist should care about small ponds. *Acta Limnologica Brasiliensia*, vol, 31, e105.
- 21) Oertli, B.D., Joye , A., Castella, E., Juge, R., Cambin, D. and Lachavanne, J.B. (2005) Ploch: A standardized method for sampling and assessing the biodiversity in ponds, *Aquatic conservation: Marine and Fresgwater Ecosystems*, 15: 665-679.
- 22) Oertli, B.D.; Joye, A.; Castella, E.; Juge, R.; Lehmaan, Lachavanne, J.B. (2005) Ploch: a standardized method for sampling and assessing the biodiversity in ponds, *Aquatic conservation, Marine and freshwater Ecosystem*, 15:665-679.
- 23) Pinto- Cruz, C., Molina, J.A., Barbour, M., Shiva, V., Espirito-Santo, M.D. (2009) Plant communities as a tool in temporary ponds conservation in SW Portugal, *Hydrobiologia*, 634, 11-24.
- 24) Rajagopal, T.; Thangamani, A.; Archunan, G. (2010) Comparison of physic-chemical parameters and phytoplanktonspecies diversity of two perennial ponds in Sattur area, TamilNadu, *J. Env. Biol.* 31(5), pp. 787-794.

- 25) Ripple WJ, Wolf C, Newsome, T.M., Galetti M, Alamgir M, Crist E, Mahmoud M I, Laurance WF. (2017) 15.364 scientist signatories from 184 countries. World scientist warming to humanity a second notice. *Bioscience* <http://doi.org/10.1093/biosci/bix125>
- 26) Scheffer, M.; Zimmer, K.; Jeppesen, E.; Butler, M.G.; Van Geest, G.J.; Hanson, M. A.; Sondergaard, M.; Declerk, S.; De Meester, L. (2006) Small biotope size and isolation can promote species richness: second-order effects on biodiversity in shallow lakes and pond. *Oikos*. 112, pp. 227-231.
- 27) Sousa E.; Quintio V.; Palhas J.; Roudrigues AM. (2016) Teixeira J. Can environmental education actions change public attitudes? An example using the pond habitat and associated biodiversity, *PLOS ONE*, 11 (5): e0154440, doi: 10.1371/journal.
- 28) Sutherland, W.J., Bailey, M.J., Bainbridge, L.P. Bereton, T., Dick, J.T. A., Drewitt, J., Dulvy, N.k., Dusic, N.R., Freckleton, R.P., Gaston, K.J., Gildrer, P.M., Green, R.E., Heathwaite, A.L., Johnson, S.M., Macdonald, D.W., Mitchell, R., Obsom, D., Owen, R.P. Pretty, J., Prior, S.V., Prosser, H., Pullin, A.S., Rose, P., Stott, A., Tew, T., Thomas, C.D., Thompson, D. B. A., Vickery, J.A. Walker, M., Walmsely, C., Warrington, S., Watksion, A.R., Williams, R.J., Woodroffe, R., & Woodroof, H.J., (2008) Future novel threats and opportunities facing UK biodiversity identified by horizon scanning *journal of Applied Ecology* 45, 821-833.
- 29) Takamra, N. (2012) Status of biodiversity loss in lakes and ponds in Japan. In S. Nakano, T.Yahara & T. Nakahizerka (Eds.). *The biodiversity observation network in the Asia-Pacific region: Towards future development and monitoring* Tokyo: Springer, Pp. 133-148.
- 30) United Nation Educational Scientific and Cultural Organization (UNESCO), (2007) *Case studies on climate change and World heritage*, UNESCO World Heritage Centre, France.
- 31) Wetzel, R.G. (2001) *Limnology: Lake and River Ecosystems*. 3rded. San.Diego, C.A.
- 32) Williams, P.; Whitfield, M.; Biggs, J.; Bray, S.; Fox, G.; Nicolet, P.; Sear, D. (2004) Comparative biodiversity of rivers, streams, ditches and ponds in an agricultural landscape in Southern England, *Biological conservation*. 115(2), pp. 329-341.
- 33) Yadav, V.K., Sharma, S., Srivastava, A.K. and Khare, P.K. (2017) Study of Pond status in India: A Review. *Flora and Fauna*. Vol. 23, No.1, pp: 99-104.
- 34) Zacharis, I. Dimitirou, E., Dekker, A, Dorsaman, E. (2007) Overview of temporary ponds in the Mediterranean region: Threats, management and conservation issue, *Journal of Environmental Biology*. 28(1): 1-9.