



Hydrobiological Studies on Rivers and Dams: A Review On Over All Scenario

R. R. More

Department of Botany, Jijamata A. S. C. College Nandurbar. (M.S.) 425412, India

ABSTRACT

Hydrobiology is the science of life and life process in water much of modern hydrobiology can be viewed as sub discipline of ecology but hydrobiology includes taxonomy, economic biology, industrial biology, morphology. Limnology is the study of all types of fresh water bodies with respect to physical, chemical and biological characteristics (Das 1989). Studies on the ecology of various water reservoirs dams and rivers with relation to algae have been carried out extensively in different part of India. In the present review literature which focused on the pollution of water, quantitative study of algal taxa and the different works done around the globe with this respect.

Key words: Algae, Diversity, International scenario, Aquatic habitat, Marine Water, Fresh Water and Phytoplankton's.

1. Introduction

Water is one of the most essential substances available on earth. India is rich in surface water resources. With the rapid increase in population, the demand for irrigation, natural resources and industrial use has increase considerably. This puts tremendous pressure on the limited fresh water. Uncontrolled disposals of urban waste, industrial and agricultural waste like fertilizers, agrochemical, contaminated the water qualities of surface water. Ultimately most of the fresh water bodies are polluted in the religious undergoing development. A fresh water ecosystem varies in size and composition and contains a wide range of organisms which interact with each other. The dynamic heterozygous relationship gains varied physical, chemical and biological elements in the fresh water ecosystem, which can be recorded by regular monitoring to maintain the integrity and conserve the ecosystem. Basavarajapp et al., (2010))

Rivers are the lifelines of the majority of the population. Our most ancient civilizations grew along the banks of the river. Today millions of people all over the world live on the banks of rivers and depend on them for survival. Rivers are nothing but the larger orders of streams flowing from a high altitude to low altitude due to pull of gravity (Singh 1993). Rivers carry dissolved minerals, organic compounds, small particles of sand gravel and other materials as they flow downstream. Water reservoir is used for most of the human activities like bathing, drinking, washing, irrigation, industrial, supply etc. Most of the reservoirs are heavily polluted Chacko and Ganpati, (1949), Nirmal Kumar et al., (1991) Biswas et al., Chopra and Patrick (2000).

2. International Scenarios of Hydrobiological studies:

Dingley (2001) attempted 58 new species new records for New South Wales of which 27 are newly recorded in Australia. Komarek and Janakovska (2001) enumerated 24 species of *Pediastrum* have been described from the World and among them four species are Worldwide in distribution generally in eutrophic waters. S.M. Leghari (2001) studied fifty nine taxa of *Desmids*, *Sicldharthavator* *Cosmarium* were recorded from Riverian ponda, Bakar and Kinjhar lakes of Sindh. Talling and Parker (2002), studied seasonal dynamics of phytoplanktons, abundance and bloom were detected in spring and summer observed in shallow Upland lake Malham Tarn, Northern England. Hubble and Harper (2002). They found nutrient limitation is also on important factor for phytoplankton abundance in shallow freshwater lakes Naivasha Kenya.

Cetin (2002) observed that the temporal changes that causes uncertainty in phytoplankton composition and assemblage of Golbasi Lake Turkey. Isbakan et al., (2002) reported *Pediastrum* species were found in oligomesotrophic reservoirs in Turkey. Chellappa et al., (2004) reported that Cynophyceae member having capacity to grow turbid water low light intensity to maintain buoyancy and the capacity to grow expontially in wet period in which nitrogenous nutrients were high observed in Campo Gande reservoir as in Brazil. Pasztaleniec and Poniewozik (2004) enumerated the knowledge of *Pediastrum* useful for the determination of trophocity of water at present and past. Abdo (2005) studied physico – chemical characteristic of Abu Za Baal Pond, Egypt and concluded that; pond is in oligotrophic. Aysel (2005) reported 29 species are new records for Turkish freshwater algae. Ying Ouyang (2005) Evaluation of water quality and concluded calcium ranges between 39 to 78 mg/L fawring the dominance of

Bacillariophyceae. Iqbal et al., (2006) worked on limnological study of river Soon, Pakistan. They reported 134 phytoplankton genera and concluded water quality in safe limits.

Adefemi et al., (2007) investigated the physico-chemical status of water from Major dams in Ekiti State, Nigeria they found the physico-chemical parameter determined where higher in the summer season than other season. Tas and Einnol (2007) Studied ecological characteristics not only reflect the quality of an aquatic ecosystem but also its biological productivity.

Adesalu and Nwankwo (2008) reported *Spirogyra* sp and *Closterium acerosum* these two species indicate the eutrophic nature of water body. Rai et al., (2008) preliminary work on the desmids reported 36 taxa belonging to 7 genera of desmids have been described from Bees-hazaar Lake of which 11 taxa are recorded for first time for Nepal. Razak Abdul et al., (2009) Assessment of water quality of the Oti River in Ghana. Their studies revealed that, Nitrate showed comparatively higher values in monsoon, which may be due to surface run-off from farms and storm water runoff in to the river during rainy season.

Hassan et al., (2010) studied the distribution of algae in relation to the physico-chemical properties of three ponds in Kano city, Nigeria concluded the largest number of algae probably due to the favourable physico-chemical properties. Kowalska and Wolowski (2010) their studies revealed that, most of the species of *Pediastrum* are restricted in particular geographical areas. Maria da Graca Sophia and Carmen Perez (2010) studied planktic desmids from Merin Lagoon a biosphere world reserve Brazil. They encountered 61 *desmids* taxa belonging to 15 genera of *Staurastrum* Meyen *Cosmarium* corde and *Closterium* Nitzsch ex Ralfs *Staurodesmus* Teiling concluded *Staurastrum* and *Cosmarium* were the most represented genera. Sevindik et al., (2010) reported 29 species are new records for Turkish freshwater algae.

Ali et al., (2011) concluded *desmids* are important members of algal communities. They play a significant role as primary producers in aquatic ecosystems. Maraslioglu et al., (2011) studied the Chlorococcales Chlorophyta community structure and seasonal variations in terms of species composition and abundance of dominant species in Tath, Gici, Liman and Cernek lakes, Turkey. A total 36 *Chlorococcales* species were reported and concluded different seasonal trends indicating high species richness. Prasad, (2011) reported five species of *Oedogonium* from Nepal.

Mubashrah Munir et al., (2012) reported taxonomic enumeration of Bacillariophyta group from Kallar Kahur Lake in Pakistan. They enumerated 35 species distributed in two orders, 7 families and 15 genera have been reported for the first time in that area. Rai (2012) reported six species and genus *Oedogonium* Link from Nepal, five species recorded for the first time in Nepal. Raj S. K. and P. K. Misra (2012) recorded twenty taxa of *Pediastrum* in East Nepal. They reported that *Pediastrum* is not restricted East and central part of Nepal.

Han Soon Kim (2013) study summarizes the occurrence, distribution and autecology of 12 taxa of the class Cynophyceae collected in South Korea. He recorded one new species, *Anabaena* Korean sp. nov and 11 species that are recorded for the first time in Korean freshwater algal flora.

3.National Scenarios of Hydrobiological studies:

A large number of workers from India have worked on limnology and ecological aspects of freshwater bodies, including rivers, dams, lakes, ponds etc. but hydro biologically, very few were study with relation to algal flora. Work on distribution, ecology and periodicity of algae began after the session of Indian Science Congress, Calcutta (1938) following the main theme of the session "Algal problem peculiar to tropics with special reference to India".

Bahura (2001) studies on highly eutrophic temple tank situated near Bikaner, Rajasthan. Jarousha (2002) reported that higher diversity of the blue green algae may be attributed to high nitrate values during the rainy season. Kiran et al., (2002), has reported that higher range of Carbon dioxide promoted the moderate growth of Euglenophyceae. Sukumaran (2002) studied in a perennial tank in Bangalore. The disposal of agricultural waste and untreated sewage into water body adversely affected flora and fauna. They concluded organic content leading to eutrophication and deterioration of the quality of water.

Tiwari and Chauhan (2006) studied physico-chemical characteristics and Phytoplankton population of Kitham lake reporting 73 genera. They observe Phytoplankton population showed two peaks, in winter and summer. Tiwari and Chauhan (2006) reported the seasonal Phytoplanktonic diversity of Katham lake, Agra. Vishnoi and Srivastava (2006), have reported the algal taxa from alkaline pond of Gura Vishnoiyan near Jodhpur, Rajasthan. The physico-chemical parameters change throughout the year which shows a diverse pattern of distribution of algal flora. They recorded 36 species of Cynophyceae members and 10 species of Chlorophyceae.

Das and Chakrabarty (2007) performed the study limnological survey of three tropical water reservoirs in Eastern India reported 32 pollution tolerant genera of algae were recorded in 3 water reservoir were organically polluted. Muthukumar et al., (2007) studied Cynobacterial Biodiversity from different fresh water ponds of Thanjavur, Tamilnadu and reported 39 taxa of 20 genera of Cyanobacteria in all five different ponds.

Mahendraperumal and Anand (2008), studied fresh water algae of Tamilnadu is based on different types of lotic and lentic water bodies. Misra et al., (2008) performed water quality index and suitability of water Kohargaddi dam at district Balrampur. The result concluded that their seasonal rhythm in some physico-chemical parameters and water quality index. The result indicate poor status of water during monsoon and winter season. Parasher et al., (2008) reported that the range of pH (7.2-7.8), alkalinity (80-120 ppm), dissolved oxygen (7.02- 8.73 mg/L) and BOD (1.4 -2.4 ppm) is the normal level of drinking water reservoir studied in Bhopal (M.P).

Sankaran (2009), studied taxonomic groups of freshwater algal ecosystem in Anaimalai hills of Tamil Nadu. Thirugnanamoorthy and Selvaraju (2009) did preliminary studied phytoplankton diversity in relation to physico-chemical parameters of Gnanprekasam temple pond of Chindambaram in Tamil Nadu India and reported that the distribution and population density of phytoplankton species depends upon the physico-chemical parameters of the environment and concluded the pond is mesotrophic in nature. Toppo and Suseela (2009) enumerated 28 species of *Cosmarium* from Mani Pokhar of Jashpur district. All these species have been recorded for the first time from Chhattisgarh. Arulmurugan et al., (2010), investigated in temple tank of Kerala and they observed depending upon the season, the algae appeared and disappeared and concluded seasonal variation in combination with ecosystem.

Arulmurugan (2011) studied fresh water algae from University of Madras Guindy campus Chennai reported 39 genera 62 species belonging to Chlorophyceae, Bacillariophyceae and Cynophyceae. Mary Kensa (2011), studied perennial ponds, observed Phytoplankton diversity was low in Undichalkulam, concluded due to high organic and sewage pollution. Rita et al., (2012) studied Sabarmati River, Ahmadabad, and reported 48 species of phytoplankton among these 21 species of Chlorophyceae, 13 species of Bacillariophyceae, 11 species Cynophyceae and 3 species of Euglenophyceae are the algal flora of polluted water bodies.

Chalotra Priyanka et al., (2013) enumeration of four species of pond scum genus Zyghemopsis Skuja from different water bodies of Jammu and Kashmir. The species were taxonomic determined on the basis of vegetative and reproductive structure. Jose John et al., (2013). New addition to fresh water algae of Western Ghats Idukki District, Kerala, reported that 19 new taxa to the class Chlorophyceae are new to science and new reports from Indian subcontinents and Kerala State.

Elumalai et al., (2014) studied algae from Presidency college campus Chennai reported 25 genera and 36 species belonging to Chlorophyceae, Bacillariophyceae, Cynophyceae and Euglenophyceae.

Acknowledgment

Author is thankful to the Principal and all supporting staff of Jijamata College Nandurbar for their support and guidance throughout the course of the present literature review study. Author is also thankful to all the teaching and non teaching staff who are directly and indirectly helped to complete work successfully.

REFERENCE

- [1] Tugba Ongun Sevindik (2010), Phytoplankton composition of Caygoren Reservoir, Balıke sir- Turkey. Turkish Journal of Fisheries and Aquatic Science 10:295-304.
- [2] Isbakan (Tas) B., A. Gonulol and E. Tas (2002). A study on the seasonal variation of the phytoplankton of Lake Cernek (Samsun - Turkey). Turkish journal of fisheries and Aquatic Science, 2: 121-128.
- [3] Round F.E. (1956). The phytoplankton of their water supply reservoir note Central Wales. *Arch. F. Hydrobiol* 220-232.
- [4] Sevindik (Ongun) T., Celik K. and Gonulol A. (2010). Twenty four new records for the freshwater algae of Turkey. Turkish Journal of Botany, 34: 249- 259.
- [5] Sultan Mahmood Leghari (2001). Freshwater algae of Sindh. V. The Desmids from the lakes and ponds of Sindh, Pakistan. *Online J. of Biological science* 1(6): 456-460.
- [6] Waqar-ul-Haq Z., Ali Masud-ul Hasan and M. Shameel (2010). Taxonomic study on ten Species of *Cosmarium Corola* (Desmidiophyceae Shameel) from north-eastern areas of Pakistan *International J. of Phycology and Phycochemistry* 6: 107-114.
- [7] Chellappa N.T., J.M. Borba and O. Rocha (2008) Phytoplankton community and physico-chemical characteristics of water in public reservoir of Cruzeta. RN. Brazil *J. Biol.*, 68, 477-494.
- [8] Chellappa S.L., I.R. Marinho and N.T. Chellappa (2004) Freshwater phytoplankton assemblage and the bloom of toxic Cynophyceae of Brazil *Indian Hydrobiology* 7: 151-171.
- [9] Johnson M.E.C. Algal flora of Banjara and Nadimi Lakes. *J. Ind. Bot. Soc* 85, 103-106 (2006).
- [10] Rai, S. K. and P. K. Misra (2007) *Spirogyra* Link and *Sirognium* Kutzing species ;New to algal flora of Nepal *Ecoprint* 14 ;89- 96 .
- [11] Prasad .V.(2011) *Modern check list of algal of Nepal*. S. Devi Manipal House, Vishwa, Birguni Nepal. 84 p .
- [12] Rai Shiva Kumar (2012) Five new species of *Oedogonium* Link (Chlorophyta) a freshwater filamentous algal from Nepal. *Nepalese J. of Bioscience* 2; 17-23.
- [13] Mubashrah Munir, R. Qureshi, M. Arshad Abdul, K. Chaudhari and M. L. Leghari (2012) Taxonomic study of Bacillariophyta from kallar kahar Lake Chakwal Punjab Pakistan. *Pak.J.Bot.*44 (5); 1805-1814.
- [14] Dingley. M. (2001) of New South Wales: New species and new records. *Telopea* 9(3);pp601-637.
- [15] Komarek J. and V. Janakovska (2001) Review of the green algae genus *Pediastrum*: Implication for pollen-analytical research. *Bibl. Phycol.*, Cramer J. Berlin-stuttgart.108p.
- [16] Kowalska J. and K. Wolowski (2010) Rare *Pediastrum* species (Chlorophyceae) from Polish Coastal lakes. *Aeta Societatis Botanicorum poloniae* 79(3):225-233.
- [17] Pasztaleniec A. and M. Poniewozik. (2004) *Pediastrum* species in phytoplankton of Sumin Lake *Aeta Societatis Botanicorum poloniae* 3(1); 39-46.
- [18] Rai, S. K. and P.K. Misra (2012) Taxonomy and diversity a Genus *Pediastrum* Meyen (Chlorophyceae, Algae) in East Nepal. *Our nature* 10:167-175.
- [19] Talling f and Parker Je (2002) Seasonal dynamics of phytoplankton and phytobenthos ,and associated chemical interactions, in a shallow upland lake (Malham Tarn, Northern England).*Hydrobiologia* 487:167-181.
- [20] Hubble Ds and Harper Dm (2002) Nutrient control of phytoplankton production in Lake Naivasha, Kenya, *Hydrobiologia* 488:99-105.
- [21] Cetin A.k (2000).Phytoplankton of Golbasi Lake (Adiyaman, Turkey) and their seasonal variations. *International Journal on Algae* 2:87-96.
- [22] Hassan K.Y., A.S. Kutama and Y. Ibrahim.(2010) Algal diversity in relation to physico-chemical Parameters of three ponds in Kano metropolis, Nigeria.
- [23] Zarina, A. UL-Haq-Waqar, UL-Hasan-Masud and Mustafa Shameel. (2012): Taxonomic study of ten marc Species of *Cosmarium* from North Eastern areas of Pakistan. *Pak. J. Bot.*, 44(6); 2135-2138.
- [24] Ying Ouyang,(2005):Evolution of water quality monitoring stations by principal component analysis *Water Research* 39 :2621-2635.

- [25] Prasad, V. (2011): *Modern Check-list of algae of Nepal*. Heritage Publishers and Distributors Pvt. Ltd Kathmandu, Nepal.85p.
- [26] Ali A., Z. K. Shinwari and M. k. Leghari (2011): Diversity of the genera of Chlorophyta in freshwaters of district Swat. N. W.F.P. Pakistan. *Pak. J. Bot.* 43(3):1759-1764.
- [27] Waqar-Ul-Haq, Zarina Ali, Masud-Ul-Hasan and Mustafa Shameel.(2012): taxonomic study of some *Cosmarium* species from North-Eastern Areas of Pakistan. *Proceeding of the Pakistan Academy of Sciences* 49(3);181-186.
- [28] Aysel V. (2005): Check-list of the Freshwater Algae of Turkey. *J. of the Black Sea/Mediterranean Environment* ,11(1):1-124.
- [29] Tas B. and Gonnol A. (2007):An ecological and taxonomic study on phytoplankton of shallow lake, Turkey. *J. Environ. Biol.* 28:439-445.
- [30] Adesalu T.A. and D.I. Nwankwo (2008): Effect of water quality indices on phytoplankton of a sluggish Tidel Creek in Lagos. Nigeria. *Pakistan J. Biol. Sci* 11:836-844.
- [31] Rai S.K., R.K. Rai and N. Paudel. (2008): Desmids from Bees-hazaar Lake, Chitwan Nepal. *Our Nature* 6:58-66.
- [32] Maraslioglu, Faruk, Elif Neyran Soylu and Arif Gonulol (2011): Chlorococcales Chlorophyta composition, Community structure and seasonal variations in the shallow lakes of the Kizilirmak Delta, Turkey. *Turk J. Biol* 35:117-124.
- [33] Soylu E.N., A. Gonulol (2010): Seasonal and diversity of phytoplankton in a eutrophic lagoon. *J. of Environmental Biology* 31:629-636.
- [34] Maria de Grace Sophia and Maria del Carmen Perez (2010): Planktic Desmids from Merin Lagoon , a biosphere world reserve IHERINGIA, Ser. Bot. Porto Alegre V. 65,n2,p.183-199.
- [35] Stastny Jan (2010): Desmids (Conjugatophyceae Virdplantae) from the Czech Republic; new and rare taxa, distribution ,ecology. *Fottea* 10(1):1-74.
- [36] Geraldo Jose Peixoto Ramos, Carlos Eduardo de Mattos Bicudo, Aristoteles Goes Neto and Carlos Wallace do Nascimento Moura (2012) *Monoraphidium* and *Ankistrodesmus* (Chlorophyceae, Chlorophyta) from Pantanal dos Marimbus, Chapada Diamantine, Bahia State, Brazil. *Hoehnea* 39(3):421-434.
- [37] Bhatt L.R. P. Lacout, H.D. Lekhal and P.K. Jha (1999): Physico- chemical characteristics and phytoplanktons for Taudha Lake, Kathmandu .*Pollution Research* ,18:353-358.
- [38] Razak Abdul A., A.B. Asiedu, Entsua-Mensah REM, de Graft Johnson KAA.(2009): Assessment of water quality of the Oti River in Ghana. *West African J. App. Ecol.* Vol. 15
- [39] Han Soon Kim (2013): *Anabaena* Korean sp. Nov. (Cynophyceae), a new species, and new record of fresh-water blue-green algae from Korea. *J. of Ecology Environ* ,36(4):293-302.
- [40] Abdo Mohamed H .(2005): Physico-chemical characteristics of Abu Za Baal Ponds, Egypt. *Egyptian J. of Aquatic Research* 31 (2):1-15 .
- [41] Iqbal F., M. Ali and N. Kanwal (2006). Limnological study of river Soon (Punjab) Pakistan. *Agricu. Conspectus Scientificis.* 71(2):65-73.
- [42] Adefemi O.S., S.S. Asaolu and O. Oldofe (2007). Assessment of the physico-chemical status of water samples from Majjor Dams in Ekiti state, Nigeria, *Pakistan J. of Nutrition* 6(6):657-559.