



EFFECTS OF CLIMATIC CHANGES ON POND ECOSYSTEM

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ABSTRACT:

Ponds are aquatic home for various flora and fauna which is called as aquatic ecosystem. The pond ecosystem is severely affected by the climatic change which causes acid rain, poor monsoon, global warming, UV radiation etc. This will lead to increase the pH and temperature of pond water. Hence the pond ecosystem is affected severely. Apart from these, the ponds met so many problems like dumping of waste products from industries and real estate business. Many ponds are converted into buildings and apartments. So that millions of living organism have lost their home and destroyed. In the present study we have analyzed the ecosystem, physical and chemical parameters of three ponds namely Vayalnambikulam, Kanganankulam and Pillaikulam located in Tirunelveli District, Tamilnadu. We have compared the results with the ten years back (2010) results. During ten years (2010-2020), the area of the ponds is greatly reduced and the physical and chemical parameters are altered heavily. The percentage of the ecosystem also very much reduced. Climatic changes are caused by anthropogenic activities like burning of fossil fuels which emit CO₂, CO, CFC etc. Hence, we are the responsible for avoiding the climatic changes and saving the pond ecosystem and our earth.

Keywords: Aquatic ecosystem, UV radiation, global warming and Anthropogenic activities

INTRODUCTION:

Ponds are serving as home for many biotic and abiotic components. The biotic components include producers, consumers and decomposers. Many micro and macro plants living in the ponds as producers (Nebel & Wright, 1993). The producers, consumers and decomposers are interlinked to form a food web. According to Downing *et al.*, (2006), the world comprises 30% of ponds among the total standing water. Currently the pond ecosystem is threatened by many anthropogenic activities and climatic changes. The anthropogenic activities include

dumping domestic wastes and industrial wastes, conversion of ponds into buildings etc. The climatic changes cause the acid rain, global warming, UV radiation and poor monsoon etc.

these factors affect the biodiversity of pond directly (Matthews, 2010). The domestic wastes cause the accumulation of micro and macro nutrients in the pond water and it leads to the eutrophication. The industrial wastes cause severe water pollution because of the presence of heavy metals like cadmium, lead and mercury etc. This will lead to change the acidity and hardness of pond water (Steidl *et al.*, 2008). Due to real estate business, the ponds are converted into buildings and apartments. So that it is very rare to see the ponds now. Burning plastic materials, emission of CO and CFC causes the climatic changes. The climatic changes cause the death of flora and fauna of the pond ecosystem. Every year millions of fishes and other fresh water animals are dying due to climatic changes and anthropogenic activities (Hassan *et al.*, 2020).

Hence the present study is focused to analyze the ecosystem, physical and chemical parameters of three ponds namely Vayalnambikulam, Kanganankulam and Pillaikulam located in Tirunelveli District, Tamilnadu.

MATERIALS AND METHODS

Study area

Three ponds namely Vayalnambikulam, Kanganankulam and Pillaikulam located in Tirunelveli District, Tamilnadu were selected as

RESULTS AND DISCUSSION:

In Vayalnambikulam pond, the temperature of water was calculated as 30°C in 2010 and 37 °C in 2020. The turbidity was recorded as 9 in 2010 and 11 in 2020. During the ten years, the value of total dissolved solids was increased from 250 ppm to 355 ppm. The electrical conductivity was increased from 336 S/cm to 410 S/cm. Likewise, the pH of the pond water was recorded as 7 in the year 2010 and in 2020 it was recorded as 8. The alkalinity of water was 110 mEq/l and now it was increased into 135 mEq/l. The total hardness of pond water was highly increased from 90 mg/l to 245 mg/l. The value of BOD and dissolved oxygen level was recorded as 6 mg/l in the year 2010. But in 2020 it was recorded as 9 mg/l (Table 1).

In Kanganankulam pond, the temperature of water was calculated as 33°C in 2010 and 39 °C in 2020. The turbidity was recorded as 8 in 2010 and 12 in 2020. During the ten years, the value of total dissolved solids was increased from 300 ppm to 383 ppm. The electrical conductivity was increased from 346 S/cm to 425S/cm. Likewise, the pH of the pond water was recorded as 6 in the year 2010 and in 2020 it was recorded as 8. The alkalinity of water was 140 mEq/l and now it was increased into 160 mEq/l. The total hardness of pond water was highly increased from 95 mg/l to 367 mg/l. The value of BOD and dissolved oxygen level was recorded as 6 mg/l and 7 mg/l in the

study area for the present study. The water sample was collected from these ponds.

Analysis of physical parameters

All the physical parameters like temperature, turbidity, electrical conductivity etc., were determined by standard filtration methods.

Analysis of chemical parameters

All the chemical parameters like pH, total hardness, BOD, dissolved oxygen were calculated by Winkler's method.

year 2010 respectively. But in 2020 it was recorded as 9 mg/l and 8 mg/l respectively (Table 1).

In Pillaikulam pond, the temperature of water was calculated as 34°C in 2010 and 37 °C in 2020. The turbidity was recorded as 7 in 2010 and 14 in 2020. During the ten years, the value of total dissolved solids was increased from 310 ppm to 368 ppm. The electrical conductivity was increased from 322 S/cm to 385 S/cm. Likewise, the pH of the pond water was recorded as 7 in the year 2010 and in 2020 it was recorded as 9. The alkalinity of water was 130 mEq/l and now it was increased into 150 mEq/l. The total hardness of pond water was highly increased from 98 mg/l to 225 mg/l. The value of BOD and dissolved oxygen level was recorded as 7 mg/l and 8 mg/l in the year 2010 respectively. But in 2020 it was recorded as 9 mg/l respectively (Table 1).

The physicochemical analysis of three ponds water showed very high values, when compared with 2010 records. During the ten years, all the physicochemical factors are greatly increased. Matthews (2010), analyzed the role of water volume on temperature shifts in small lentic system. His results proved that the temperature of pond water is increased due to climatic changes. According to the findings of Stocker *et al.*, (2013) and Hansen and Cramer (2015), the climatic changes directly affect the pond ecosystem as well

as human system. Firth and Fisher (1992); Poff *et al* (2002); Glen (2010); Boon and Raven (2012) reported that the effects of eutrophication, invasion of exotic species and rising temperature. Covich *et al* (2004) and Gillson *et al* (2013) also state that the synergistic and analogistic effects of climatic and anthropogenic effects on fresh water ecosystem in their research.

CONCLUSION:

During the ten years (2010-2020), the area of the ponds is greatly reduced and the physical and chemical parameters are altered heavily. The percentage of the ecosystem also very much reduced. So that millions of living organism have lost their home and destroyed. Climatic changes are caused by anthropogenic activities like burning of fossil fuels which emit CO₂, CO, CFC etc. Hence, we are the responsible for avoiding the climatic changes and saving the pond ecosystem and our earth.

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Physical & Chemical Parameters	Name of the ponds					
	Vayalnambi kulam		Kanganan kulam		Pillai	kulam
	2010	2020	2010	2020	2010	
Temperature (°C)	30.40	37.30	33.85	39.10	34.1	37.4
Turbidity (NTU)	9	11	8	12	7	14
Total Dissolved Solids (ppm)	250	355	300	383	310	368
Electrical conductivity (S/cm)	336	410	346	425	322	385
pH	7.10	9.00	6.10	8.00	7.2	9.2
Alkalinity (mEq/l)	110	135	140	160	130	150
Total hardness (mg/l)	90	245	95	267	98	225
Dissolved Oxygen (mg/l)	6	9	7	9	8	9
BOD (mg/l)	6	9	6	8	7	9