

Full Length Research Paper

Diversity and distribution of Aquatic Macrophytes in Gudavi Wetland, Sorab Taluk, Karnataka, India

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Abstract

Among aquatic macrophytes, a total of 16 species belonging to 15 genera and 12 families were recorded from Gudavi pond, Karnataka during January to December 2015. Free floating macrophytes were regarded as pollution tolerant species and be used as a biological indicator for eutrophication. It indicates that aquatic macrophyte species are specific to the environmental quality. The present findings revealed that the surface quality of the pond is productive. It indicates that, aquatic macrophytes species are specific to the environmental quality and can be used as agent in bioremediation.

Key words: Aquatic macrophytes, Gudavi pond, Environmental indicators

Introduction

Macrophytes are important component and play a major role in primary productivity of the aquatic ecosystem. Aquatic macrophytes used nutrient and thus influences water quality. It also controls water quality by exuding various organic and mineral components. Aquatic communities reflect anthropogenic influence and are very useful to detect and assess human impacts (Solak *et al.*, 2012). Macrophytes are considered as important component of the aquatic ecosystem not only as food source for aquatic invertebrates, but also act as an efficient accumulator of heavy metals (Chung and Jeng, 1974; Ayodhya *et. al.*, 2013).

The aim of the present study was to know the diversity and distribution of aquatic macrophytes and to determine the water quality of Gudavi pond from Soraba taluk of Karnataka, India.

Materials and Methods**Study Area**

The Gudavi Bird Sanctuary is located in Soraba Taluk of Shimoga District in the state of Karnataka and is one of the most picturesque and well-known bird sanctuaries of India. It is situated 13 Km away from Soraba town and about 0.50 Km from Gudavi village. The Gudavi Bird Sanctuary was initially notified on 10.07.1989 and subsequently it took its birth as an independent Bird Sanctuary upon final notification on 04.09.2000. The total notified geographical area of the Gudavi Bird Sanctuary is 73.68 ha, of which the sanctuary possesses the water spread area of about 33 ha and is surrounded by moist deciduous forest, interspersed with grassy patches. Gudavi bird sanctuary lies between North Latitude 14° 1' 28". In this sanctuary, there are two° 6' 43" to 75°41" and East Longitude 75 ponds separated by an earthen bund, which are called as Vaddakere and Gudavi ponds. The catchment area for this sanctuary is mainly agriculture land and other wooded areas. The water from the main catchment area is collected in Vaddakere, from which its overflow goes to Gudavi pond; the excess water from there is used for irrigation at downstream crop lands (http://aranya.gov.in/downloads/GudviWLS_MgmtPlan.pdf).

Collection and Identification of aquatic macrophytes

Field trips were made once in a month covering entire the pond area with a view to find out the aquatic macrophytes species and their ecological features. In the present study monthly survey was done by quadrat method was employed by the methods of Raunkaier, (1934) and Stromberg, (1993) for collecting aquatic macrophytes from January- December 2015 at the selected sampling sites I(Near

entry of pond), II(Middle of the pond) and III (Near outlet). The identification of aquatic plants was done with the help of standard books and monographs like, Singh and Karthikeyan (2001), Biswas and Calder (1984). The physico-chemical parameters were estimated by referring the standard procedures of APHA (1998), Trivedi and Goel (1984) and Trivedi et al.(1998).

Results and Discussion

The physico-chemical parameters of water samples of Gudavi pond presented in Table 1 and Table 2 depicted diversity of Aquatic macrophytes.

The water temperature of the tank varied from a minimum of 25.5°C to a maximum of 29°C. pH of the water was slightly alkaline and the CO₂ level of water fluctuated from 44 to 58.5 mg/L respectively. Calcium content varied from 23.4 to 28.9 mg/L.

However, the phosphate content deviated from 1.26- 2.80 mg/L respectively. Dissolved oxygen level was maximum with 5.2 mg/L and minimum with 3.8mg/L. BOD level fluctuated 9.9 to 26.2 mg/L . Hence, pond is productive.

The increase in free CO₂, BOD, chloride and phosphate; whereas decrease in concentration of DO indicate increased with discharge of excreta from birds from surrounding areas in the water body (Kshirsagar and Gunale, 2011; Kshirsagar et al., 2012).

Table 1. Range of Physico-chemical characteristics of water of Gudavi wetland.

Sl.No.	Parameters	Range
1.	Water temperature (° C)	25.5-29
2.	pH	7.2-7.5
3.	CO ₂ , mg/L	44 - 58.5
4.	Calcium , mg/L	23.4 -28.9
5.	Dissolved Oxygen (DO), mg/L	3.8-5.2
6.	Biochemical Oxygen demand (BOD), mg/L	9.9-26.2
7.	Chloride, mg/L	57.4-62.8
8.	Phosphate, mg/L	1.26 -2.8

Table 2. Diversity of Aquatic macrophytes in Gudavi pond

Sl.No.	Scientific name	Family	Site I	SiteII	Site III
1	<i>Najas indica</i>	Hydrocharitaceae	+	-	+
2	<i>Pistia stratiotes</i>	Araceae	+	+	+
3	<i>Asterocantha longifolia</i>	Acanthaceae	+	+	+
4	<i>Caldesia arnesifolia.</i>	Alismataceae	+	+	-
5	<i>Salvinia sp.</i>	Salviniaceae	+	-	+
6	<i>Azolla pinnata</i>	Salviniaceae	+	-	+
7	<i>Nymphaea nouchalii</i>	Nymphaeaceae	+	-	+
8	<i>Nymphoides interrupta</i>	Menyanthaceae	-	+	+
9	<i>Nymphoides cristata</i>	Menyanthaceae	+	+	-
10	<i>Crinum asiatica</i>	Amaryllidaceae	-	+	-
11	<i>Polygonum plebejum</i>	Polygonaceae	-	+	+
12	<i>Cryptocoryne spiredis</i>	Araceae	+	+	+
13	<i>Limnophila graviorodes</i>	Plantaginaceae	+	+	-
14	<i>Aponogeton echinatus</i>	Aponogetonaceae	-	+	+
15	<i>Marselia quadripartite</i>	Marsileaceae	+	+	+
16	<i>Lemna major</i>	Araceae	+	+	+

Among Aquatic plants 16 species belonging to 12 families and 15 genera were recorded from Gudavi pond (Table-2). Figure 1 shows the number of aquatic macrophytes in each family. Species spectrum of macrophytes includes- *Caldesia arnesifolia*, *Pistia stratiotes*, *Najas indica*, *Nymphoides interrupta*, *Nymphoides cristata*, *Aponogeton echinatus*, *Marselia quadripartite*, *Salvia species*, *Azolla pinnata*, *Lemna species*, *Asterocantha longifolia*, *Limnophila graviorodes*, *Nymphaea nouchalii*, *Chyptocoryne spiredis*, *Polygonum plebejum* and *Crinum asiatica*.

Species among plant, indicative of organic enrichment are *Pistia stratiotes*, *Lemna major* and *Azolla pinnata*. The dominance of free floating macrophytes throughout the study , which is considered to be indicators of organic pollution.

The physico-chemical parameters of water are important factors affect the distribution and abundance of aquatic plants (Table 1). A few macrophytes are indicator of the availability of particular nutrients. The pollution indicator species such as *Pistia statiotes* also recorded which indicate eutrophication. The main source of pollution due to runoff water from agriculture fields in the rainy season carrying inorganic fertilizers, toxic pesticides and other chemicals enter in to this pond. Narayana and Somashekar (2002) and Thangadurai et al (2012) have been concluded that the physico-chemical characters influence the growth of species, distribution, indicator group and pollution tolerant species.

Gudavi pond provide habitat for pollution indicator species like *Pistia statiotes* and the water body is included under eutrophic category. Rorslet (1991) and Murphy (2001) found that the maximum macrophytes diversity was observed in mesotrophic to slightly eutrophic lakes. Therefore, similar trend was observed in the present water body.

Among 16 aquatic macrophytes, 4 species were found to occur in all the three sites of the pond. Some aquatic plants are suppressed by the dominant weed or not getting suitable environmental condition for their growth. The pond provides sufficient water for agriculture and fish culture. So the water body should be conserved.

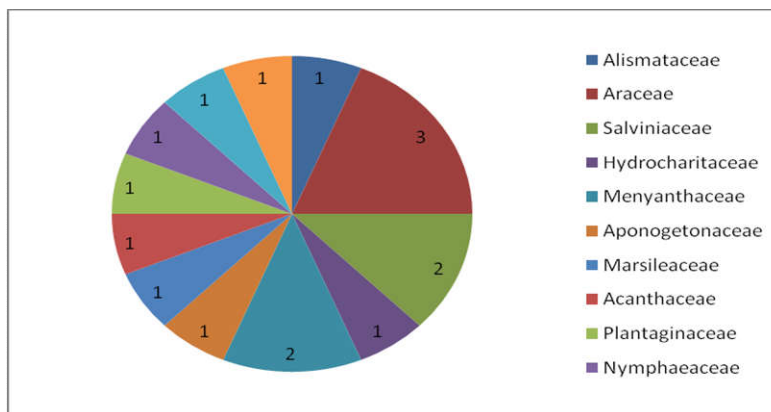


Fig 1: Number of Aquatic macrophytes in each family



Photo 1: Photography showing on spot analysis.



Photo 2: Photography showing Gudavi wetland.

Conclusion

The selected Gudavi pond has water throughout the year and has fair species richness in plants. The plants like *Pistia* are major species in the water body. A pond may consist not only the plants but is maintaining a well balanced ecosystem also. More than that they are the good water storage areas, provide sufficient water for agricultural and irrigation purposes and also increases the ground water level. So the ponds and aquatic macrophytes should be conserved.

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