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Diversity of aquatic macrophytic vegetation in summer season of Dagginakatte Lake, Channagiri Taluk, Davanagere, Karnataka

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Abstract
Macrophytes are the habitual trait of an ecosystem, they grow periodically depend upon the availability of the water. The present study deals with the diversity of aquatic macrophytic vegetation of Dagginakatte Lake of Channagiri Taluk. A comprehensive field survey and plant collection showed that the presence of 6 species of aquatic plants belonging to 6 genera and 6 families in the site. the present study was conducted during the month of March 2021 to June 2021. For four months diversity were calculated by statistical analysis. The present study reveals the ecological status including Density, Abundance and Frequency of the aquatic flora of the Dagginakatte Lake. The data recorded from the site shows the predominated species *Eichornia crassipes* having 1 frequency. It's found that highest Density 12.92 and Abundance is 12.92. Grievously aquatic ecosystem crushed expeditiously due to discrete reasons. Present paper is specifically concentrated on aquatic plants biodiversity for the conservation.

Keywords: diversity, aquatic macrophytes, Dagginakatte lake

Introduction
Habitat of aquatic plants is wet habitats. Plants occur in permanently wet places are called as "True" aquatics or hydrophytes, and the plants which may tolerate seasonal drying, are called halophytes. Usefulness of indicators is related to their sensitivity to both longer and shorter term changes in environmental factors including those that act individually, or in synergetic manner, to cause changes that may be interpreted as being damaging or beneficial. This aquatic plants can successfully use for these usefull purposes, single or in association with the monitoring of other kinds of organisms (Seddon 1972; Carbiener *et.al*, 1990; Seele *et.al*, 2000; Thiebaut *et.al*, 2002; Schneider and Melzer 2003; Stelzer *et.al*, 2005).

Aquatic plants combine temporal, spatial, chemical, physical and biological qualities of their ecosystem. Studies in different climatic regions have demonstrated the influence of interacting environmental factors on the distribution and abundance of plants in both lotic (i.e streems and rivers), and lentic (i.e lakes and ponds) waters (Suren and Ormerod 1998; Heegaard *et.al* 2001; Barendregt and Bio 2003; Bernez *et.al* 2004). In general, the relative value of specific environmental factors varies with spatial and temporal scales (French and Chambers 1996; Suren and Ormerod 1998; Lacoul and Freedman 2006) [6, 9].

Hucthinson 1978 emphasizes the usefulness of comparative studies of aquatic plants among the water bodies differing in limnological characteristics; such research in valueable in understanding the conflicts of environmental factors on species and communities. Many studies have focused on the significance to aquatic plants of factors influencing the accessibility of light, including the turbidity, dissolved organic carbon (particularly humic substances), chlorophyll (related to phytoplankton biomass), and depth (Canfield *et.al* 1985; Chambers and Kalff 1985; Stewart and Freedman 1989; Skubinna *et.al* 1995; Middelboe and Markager 1997; Vestegaard and Sand-Jensen 2000; Lacoul and Freedman 2006a). Also cited as important factors are sediment characteristics (Pearsall 1920; Barko and Smart 1986; Xie *et.al*, 2005); trophic status as related to nutrient chemistry (Hutchinson 1975; Srivastava *et.al*, 1995; Toivonen and Huttunen 1995; Jeppesen *et.al*. 2000); physical factors such as slope, wind and wave action, and hydrologic variations (Duarte and Kalff 1986; Strand and Weisner 1996; Madson *et.al*, 2001; van Geest *et.al*, 2003; Schutten *et.al*, 2004; and biological influence such as competition, allelopathy, grazing, and shading by periphyton (Sand-Jensen and Borum 1991; Gopal and Goel 1993; Lauridsen *et.al*,1993; Weisen *et.al*, 1997).

In this contexts, the review studies of the influence of environmental factors on the distribution and abundance of aquatic plants in fresh water ecosystems, with the aim of suggesting practical indicators of ecological change. Insights from this review are useful in terms of conserving macrophyte species and communities, and in planning for managing entire watersheds to conserve natural resources and biodiversity, as is being encouraged by the European Community (European Commission 2000) and other authorities. This approach involves the comparative and integrated study for biodiversity and other ecological values among types of water bodies within regions (Williams's *et.al*, 2003). Ultimately, the approach is intended to improve understanding of the effects of anthropogenic environmental change on ecological values and resources.

Materials and Methods
Study Area
Dagginakatte Lake is situated in the Channagiri Taluk, Davanagere district of Karnataka, India. Dagginakatte Lake covers a geographical area of 6 acres. About 45 % of lake is occupied by aquatic macrophytes. Channagiri taluk is one of the famous called as land of Arecanut. Channagiri is located

at 14.03°N 75.93°E. Channagiri lies on 664m above sea level. The average temperature in Channagiri is 24.9 °C | 76.8 °F. The annual rainfall is 679 mm | 26.7 inch. This consists of very good aquatic ecosystems.

Sample collection

The study area was explored thoroughly and detailed observation on the vegetation. Macrophytes were collected at an interval of 30 days, during the month of March 2021 to June 2021, for four months, summer season. Collected material were identified with the help of standard literatures and confirmed in the herbarium of Botanical Survey of India.

Statistical Analysis

The samples were collected at an interval of 30 days, during the month of March 2021 to June 2021, for four months, summer season, 1m×1m Quadrats was lied randomly. The number of macrophytes present in the Quadrat area were recorded and identified by using available manuals. The frequency, density, abundance, are calculated using respective formulas (Cottam and Curtis 1956; Magurran 1958) as follows:

$$\text{Frequency} : \frac{\text{Number of quadrant in which species occur}}{\text{Total number of quadrants studied}}$$

$$\text{Relative frequency} : \frac{\text{Frequency of a species}}{\text{Total frequency of all the species}} \times 100$$

$$\text{Density} : \frac{\text{Total number of individuals of a species}}{\text{Total number of quadrants studied}}$$

$$\text{Relative density} : \frac{\text{Density of a species}}{\text{Total density of all the species}} \times 100$$

$$\text{Abundance} : \frac{\text{Total number of individuals of a species in all the quadrants}}{\text{Total number of quadrants in which the species as occurred}}$$

Results and Discussion

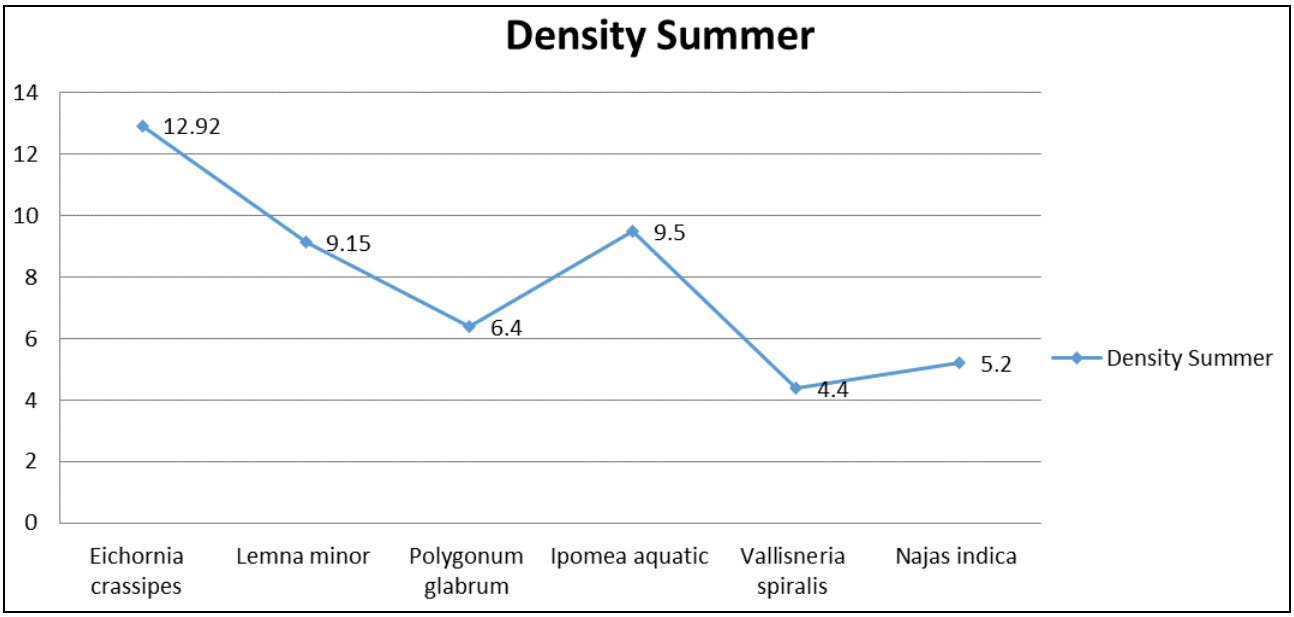
In the present investigation, Dagginakatte Lake is situated in the Channagiri Taluk, Davanagere district of Karnataka, India. Dagginakatte Lake covers a geographical area of 6 acres. About 45 % of lake is occupied by aquatic macrophytes. Channagiri taluk is one of the famous called as land of Arecanut. Channagiri is located at 14.03°N 75.93°E. And it spread in 6 acres with variety of submerged, rooted, floating macrophytes and a road passes along the bank of lake. The effluent which were discharged from the anthropogenic activities. In the present investigation of Kamsagara lake, the frequent visit during the month of March 2021 to June 2021, for four months, summer season were made and recorded 06 species by quadrant method to know the Density, Abundance, Frequency and Species Importance Value. The list of Aquatic macrophytes is furnished below Table 01.

Table 1: List of aquatic macrophytes in Dagginakatte lake

Sl. No	Species name	Family
1	*Eichornia crassipes*	Pontederiaceae
2	*Lemna minor*	Lemnaceae
3	*Polygonum glabrum*	Polygonaceae
4	*Ipomea aquatic*	Convolulaceae
5	*Vallisneria spiralis*	Hydrocharitaceae
6	*Najas indica*	Najadaceae

Table 2: Aquatic Macrophytes Density in Summer Season

Sl. No	Species name	Density
		Summer
1	*Eichornia crassipes*	12.92
2	*Lemna minor*	9.15
3	*Polygonum glabrum*	6.4
4	*Ipomea aquatic*	9.5
5	*Vallisneria spiralis*	4.4
6	*Najas indica*	5.2

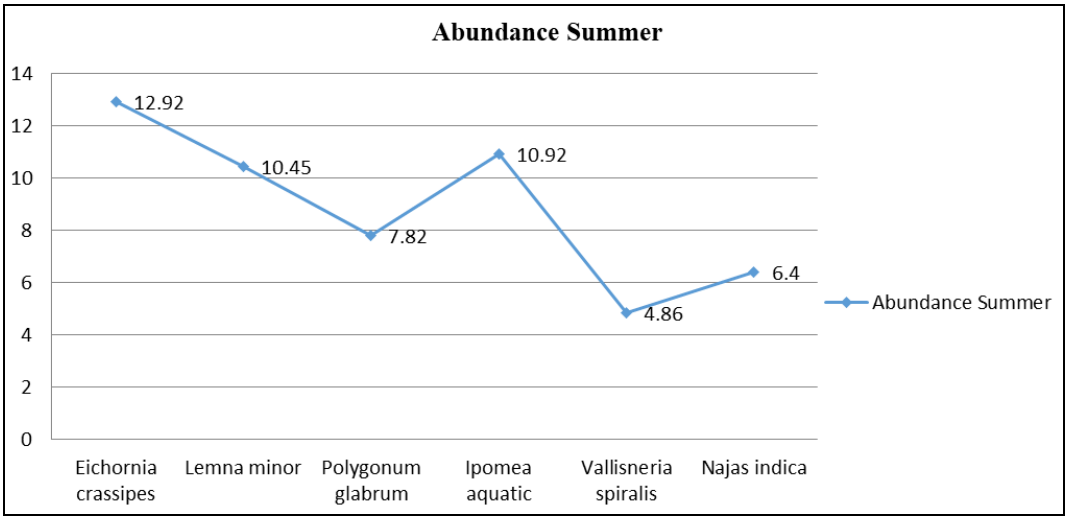


Graph 1: Aquatic Macrophytes Density in Summer Season

The density of the study site represents that, a total of 06 aquatic macrophytes belonging to 06 families were found in the lake, out of total 06 species recorded Pontederiaceae family has shown the presence of maximum number of species i.e. *Eichornia crassipes* contributing to 40-41%. Other families like Pontederiaceae, Lemnaceae, Onagraceae, Convolulaceae and Polygonaceae had one species each contributing to 10-13%. The maximum value of density was shown by *Eichornia crassipes* with values ranging from D = 12.92 in summer season followed by other species respectively.

Table 3: Aquatic Macrophytes Abundance in Summer Season

Sl. No	Species name	Abundance
		Summer
1	*Eichornia crassipes*	12.92
2	*Lemna minor*	10.45
3	*Polygonum glabrum*	7.82
4	*Ipomea aquatic*	10.92
5	*Vallisneria spiralis*	4.86
6	*Najas indica*	6.4

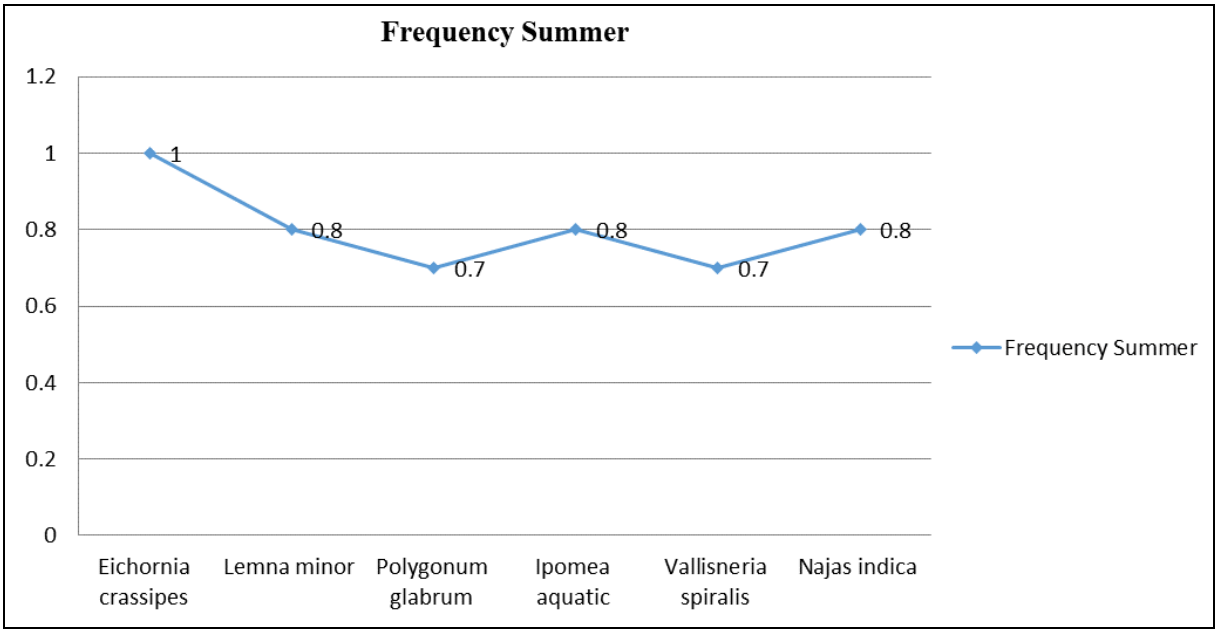


Graph 2: Aquatic Macrophytes Abundance in Summer Season

The abundance of study site represents that a total of 06 aquatic macrophytes belonging to 06 families were found in the lake, out of total 06 species recorded Pontederiaceae family has shown the presence of maximum number of species i.e. *Eichornia crassipes* contributing the maximum value of abundance was shown by *Eichornia crassipes* with values ranging from A=12.92 in summer season followed by other species respectively.

Table 4: Aquatic Macrophytes Frequency in Summer Season

Sl. No	Species Name	Frequency
		Summer
1	*Eichornia crassipes*	1
2	*Lemna minor*	0.8
3	*Polygonum glabrum*	0.7
4	*Ipomea aquatic*	0.8
5	*Vallisneria spiralis*	0.7
6	*Najas indica*	0.8



Graph 3: Aquatic Macrophytes Frequency in Summer Season

The frequency of study site represents that a total of 06 aquatic macrophytes belonging to 06 families were found in the lake, out of 06 species recorded Pontederiaceae family has shown the presence of maximum number of species, the maximum value of frequency was shown by *Eichornia crassipes* with values ranging from F=1 in summer season followed by other species respectively.

Conclusion

Aquatic plants serve as good source of food to mankind and animals thus forming a palatable food for water birds and a best for aquatic wild life conservation practices. Aquatic vesicular plants are important indicators of water pollution. Many workers contributed recent aspects of production studies of macrophytes. In this present study, *Eichornia crassipes* was enormously distributed in Dagginakatte lake and other species were also found.

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