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AQUATIC MACROPHYTE DIVERSITY OF MUL LAKE FROM MUL TALUKA OF CHANDRAPUR DISTRICT, MAHARASHTRA STATE (INDIA)

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Abstract:
Present survey of Mul lake from Mul Taluka of Chandrapur District,Maharashtra state shows 61 species of aquatic macrophyte diversity belonging to 32 families and 47 genera. Emergent macrophyte dominates and contributes 42 species(68.85%) ,followed by submerged macrophyte contributes 09 species (14.75%).Anchored floating macrophyte contributes 06 species(9.83%) and free floating contributes 04 species (6.55%). Floating macrophytes divides in two groups free floating and rooted floating. Herbaceous Macrophyte dominating and possess 53 species (86.88%) followed by creeper 05 species (8.19%), under shrub possess two species of family Fabaceae and Ipomoea carnea Jacq. is the only shrub reported from Convolvulaceae family. Angiosperms shows dominance over Pteridophytes and Algae. Dicot macrophytes possess 38 species of 20 families (62.29%)and shows dominance over monocot possess 23 species of 12 families (37.70%). Thus Mul Lake possess much diversity of macrophyte.
Keywords: Aquatic Macrophytes, Mul lake, Mul Taluka, Chandrapur District, Maharashtra state

Introduction

The term aquatic macrophyte refer to the macroscopic forms of aquatic vegetation and encompass macro algae. These are classified into emergent macrophyte, floating, submerged and free floating macrophyte **(Wetzel, 1975).** Aquatic macrophytic plants are those species which normally stand in water and must grow for at least a part of their life cycle in water, either completely submerged or emerged**(Muenscher,1944).** Aquatic macrophyte 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 **(Devlin, 1967; Chung and Jeng, 1974).**

Aquatic plants are important as they supply food and shelter for many aquatic organisms. They serve as substratum to different Micro and macro fauna **(Raut and Pejawer, 2005).** Aquatic plants constitute an integral component of an aquatic ecosystem. They may serve as good source of food to the mankind, a palatable feed to the water birds and animals thus forming a base for aquatic wildlife conservation practices. They also serve as a potential source of energy **(Majid, 1986).** Aquatic macrophyte are also responds to the changes in water quality and have been used as indicator of pollution of pollution in several cases **(Best, 1982).**

Macrophytes are important component and play a major role in primary productivity of the aquatic ecosystem. Aquatic macrophyte 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).** Aquatic weeds referred to as Macrophyte constitute an important component of aquatic ecosystem. Their diversity and biomass influence primary productivity and complexities of tropic states **(Kumar and Singh, 1987).** Macrophyte serve as a link between the sediment, water, and sometimes atmosphere in wetlands, lakes, and rivers. However, macrophyte are also involved in ecosystem processes such as bio mineralization, transpiration, sedimentation, elemental cycling, materials transformation, and release of biogenic trace gases into the atmosphere **(Carpenter and Lodge, 1986).**

Studies on Aquatic Macrophyte and its distribution and classification in India carried out by many researchers **(Subrahmanyam,1962;Bhaskar and Razi,1973;Kachroo ,1984;Lavania *et al.*1990;Cook,1996; Baruah and Baruah, 2000; Dutta *et al.*2002;Maliya and Singh,2004; Dhore *et al.*,2012;Dhore and Lachure,2014;Kumar and Pal,2015)** and many more. Reports on aquatic macrophyte from Chandrpur districts also carried out by some researchers from different region **(Khinchi *et al.*,2008; Wadhave *et al.*,2010; Harney *et al.*,2013;Sitre,2013;Sitre *et al.*,2014 and Harney,2014).**As there are no previous reported studies on aquatic macrophyte of Mul Lake from Mul Taluka of Chandrapur district. Therefore an attempt has been made to study aquatic macrophyte from this region.

Material and Methods

Study Area

Mul lake is located at 20.07°N 79.67°E near Mul city Bus stand.Mul is known as City Of Rice form Chandrapur district. Mul is a Taluka in Chandrapur District of Maharashtra State, India. Mul Taluka is bounded by by Saoli Taluka towards East , Pombhurna Taluka towards South , Sindewahi Taluka towards North , Chamorshi Taluka towards East . Mul City , Gadchiroli City , Durgapur City , Chandrapur City are the nearby Cities to Mul. It has an average elevation of 198 metres (649 feet). It belongs to Vidarbh region. It is located 45 KM towards East from District head quarters Chandrapur.(Fig.01).

Collection of macrophytes and identification

Mul Lake were surveyed for its enumeration of aquatic macrophyte periodically during the period of September 2014 to December 2015 and plant specimen were collected and by following usual laboratory procedures herbarium sheets prepared and collected in Herbarium of PG Dept of Botany, Janata Mahavidyalaya, Chandrapur. All collected aquatic macrophyte species correctly indentified using pertinent literature and flora **Cook (1996), Gupta (2001)** and **Yadav and Sardesai (2002).**These collected macrophytic plants species are classified on the basis of their habitat and morphological characteristics.

Results and Discussions

Total 61 aquatic macrophyte belonging to 32 families and 47 genrea enumerated from Mul Lake of Chandrapur District.(Table.01).Collected 61 macrophytes are classified according to various habitats in three types of life forms namely Floating, Submerged and Emergent from Mul Lake of Chandrapur District. Table-1

A. Floating macrophyte; They float over the water surface and of two kinds. Floating macrophyte represented by only 10 species .They contributes 16.39% of total macrophytes from Mul Lake. (Fig.01)

1.Free floating macrophyte-freely floating macrophytes and not fixed to the soil at bottom.Only four species namely *Lemna minor L,. Azolla pinnata* R.Br. *Eichhornia crassipes* (Mart.) S.L. *Pistia stratiotes* L., recorded as free floating macrophyte. They contributes very less percentage 6.55% of total macrophyte from Mul Lake.

2. Anchored floating macrophyte – Floating macrophytes but they anchored down to soil. Six species recorded namely *Nymphaea nouchali* Burm. f. and *Nymphaea pubescence* Willd.(Nymphaeaceae) *Ludwigia adscendens* (L.) H. Hara (Onagraceae), *Ipomoea aquatica* Forsk,(Convolvulaceae) *Nymphoides indica* (L.) Kuntze, and *Nymphoides cristata(Roxb.)*Kuntz (Menyanthaceae) .They represents only 9.83% of total macrophyte from Mul Lake.

B. Emergent Macrophyte :They grow in shallow water and existing near the wet environment. Total 42 species recorded as emergent belonging to 25 families. Emergent Macrophyte are dominating and contributes 68.85% of total macrophyte .

C.Submerged Macrophyte: These species grow, germinate , and reproduce beneath the water surface. Nine species from seven families recorded namely *Oxlis corniculata* L.(Oxalidaceae), *Ceratophyllum demersum L.*(Ceratophyllaceae), *Phyla nodiflora* (L.) Greene (Verbenaceae), *Chara globularis* J. L.Thuller(Characeae). *Hydrilla verticillata* (L. f.) Royle, Ottelia *alismoides* (L.) Pers. and *Vallisneria spiralis* L.(Hydrocharitaceae) *Najas minor* L.(Najdaceae) as submerged macrophytes..They contributes 14.75% of total macrophytes from Mul Lake.

Submerged plants are the generators of oxygen in the aquatic system. In controlled growth situations, either naturally or by human interference, aquatic plants can purify water, but if uncontrolled growth takes place, they can reach the levels of pests and are frequently regarded as aquatic weeds. Aquatic plants can reduce biological oxygen demand, and these plants are now exploited for bio filtration of organic waste in the waste water treatment systems**(Ghosh,2005).**

Macrophyte recorded from different groups like Angiosperms contributes 58 species (95.08%) followed by Pteridophytes contributes two species namely *Azolla pinnata* R.Br. *Marsilea quadrifolia* L.(3.27%) and Algae contributes single species *Chara globularis* J.L.Thuiller (1.63%).Monocots contributes 23 species(37.70%) belonging to 12 families and dicots contributes 38 species(62.29%) belonging to 20 families (Fig. 02) .Angiosperms shows dominance over Pteridophytes and Algae in Mul Lake Dicots showing dominance over monocots. Herbaceous macrophytes dominating and represents 53 species (86.88%),(Fig. 03) followed by Creepers represents only 05 species (8.19%), under shrubs only 02 (3.28%) species *Aeschynomene aspera* L. *Aeschynomene indica* L.(Fabaceae) and shrubs only *Ipomoea carnea* Jacq.(Convolvulaceae).

Asteraceae and Cyperaceae were dominating families and contributes five species each followed by Onagraceae with four species, Poaceae, Commelinaceae, Convolvulaceae, ,Lythraceae ,Molluginaceae ,Hydrocharitaceae, possess three species each .Two species possess by six famillies namely Amaranthaceae, Boraginaceae, Fabaceae, Asteraceae ,Menyanthaceae, , Nymphaeaceae, Scrophulariaceae and single species recordrded from 17 families.like Acanthaceae, Alismataceae, Araceae, Ceratophyllaceae, Characeae, Euphorbiaceae, Lemnaceae, Malvaceae, Marsileaceae, Najadaceae, ,Oxalidaceae Polygonaceae,Pontederiaceae,Portulacaceae ,,Salviniaceae, Scrophulariaceae ,Typhaceae and Verbenaceae.

Table 01. Enumeration of Aquatic Marophytes of Mul Lake of Mul Taluka ,Chandrapur district.

S.N	Botanical name	Family name	Habit	Life Form
01	*Aeschynomene aspera* L.	Fabaceae	Under Shrub	Emergent
02	*Aeschynomene indica* L.	Fabaceae	Under Shrub	Emergent
03	*Alternanthera philoxeroides* (Mar)Griesp.	Amaranthaceae	Herb	Emergent
04	*Alternanthera sessilis* (L.)R. Br. ex	Amaranthaceae	Herb	Emergent
05	*Ammannia baccifera* L.	Lythraceae	Herb	Emergent
06	*Azolla pinnata* R.Br.	Salviniaceae	Herb	Free floating
07	*Bacopa monnieri* (L.) Wettest.	Scrophulariaceae	Herb	Emergent
08	*Ceratophyllum demersum L.*	Ceratophyllaceae	Herb	Submerged
09	*Chara globularis* J.L.Thuiller	Characeae	Herb	Submerged
10	*Chrozophora rottleri* (Geisel.) A. Juss. ex. Spr	Euphorbiaceae	Herb	Emergent
11	*Coix aquatica* Roxb	Poaceae	Herb	Emergent
12	*Coldenia procumbens* L.	Boraginaceae	Creeper	Emergent
13	*Commelina benghalensis* L.	Commelinaceae	Herb	Emergent
14	*Commelina hasskarlii* C. Comm. Cyrt.	Commelinaceae	Herb	Emergent
15	*Cynodon dactylon* (L.) Pers.	Poaceae	Herb	Emergent
16	*Cyperus difformis* L	Cyperaceae	Herb	Emergent
17	*Cyperus rotundus* L.	Cyperaceae	Herb	Emergent
18	*Echinochloa colona* (L.) Link	Poaceae	Herb	Emergent
19	*Eclipta prostrata* (L.) L.	Asteraceae	Herb	Emergent
20	*Eichhornia crassipes* (Mart.) S.L.	Pontederiaceae	Herb	Free floating
21	*Eleocharis capitata* R. Br.	Cyperaceae	Herb	Emergent
22	*Eleocharis geniculata* (L.) R&S.	Cyperaceae	Herb	Emergent
23	*Glinus lotoides* L.	Molluginaceae	Creeper	Emergent
24	*Glinus oppositifolius* (L.) Aug. DC.	Molluginaceae	Creeper	Emergent
25	*Grangea maderaspatana* (L.) Poir.	Asteraceae	Herb	Emergent
26	*Heliotropium supinum* L.	Boraginaceae	Herb	Emergent
27	*Hydrilla verticillata* (L. f.) Royle	Hydrocharitaceae	Herb	Submerged
28	*Hygrophila schulli* (Harm.) M.R.&S.M.Almeida	Acanthaceae	Herb	Emergent
29	*Ipomoea aquatica* Forsk	Convolvulaceae	Herb	Anchored Floating
30	*Ipomoea carnea* Jacq.	Convolvulaceae	Shrub	Emergent
31	*Lemna minor L.*	Lemnaceae	Herb	Free floating
32	*Limnophila sessiliflora* L.	Scrophulariaceae	Herb	Emergent
33	*Ludwigia adscendens* (L.) H. Hara	Onagraceae	Herb	Anchored Floating
34	*Ludwigia parviflora* Roxb.	Onagraceae	Herb	Emergent

35	*Ludwigia perennis* L.	Onagraceae	Herb	Emergent
36	*Ludwigia perennis* L.	Onagraceae	Herb	Emergent
37	*Marsilea quadrifolia* L.	Marsileaceae	Herb	Emergent
38	*Merrimia emariginum* Burm. F	Convolvulaceae	Creeper	Emergent
39	*Mollugo pentaphylla* L.	Molluginaceae	Herb	Emergent
40	*Murdannia nudiflora* (L.) Brenan	Commelinaceae	Herb	Submerged
41	*Najas minor* L.	Najadaceae	Herb	Submerged
42	*Nymphaea nouchali* Burm. f.	Nymphaeaceae	Herb	Anchored Floating
43	*Nymphaea pubescence* Willd.	Nymphaeaceae	Herb	Anchored Floating
44	*Nymphoides cristata (Roxb.)Kuntz*	Menyanthaceae	Herb	Anchored Floating
45	*Nymphoides indica*(L.) Kuntze	Menyanthaceae	Herb	Anchored Floating
46	*Ottelia alismoides* (L.) Pers	Hydrocharitaceae	Herb	Submerged
47	*Oxlis corniculata* L.	Oxalidaceae	Herb	Submerged
48	*Parthenium hysterophorus* L.	Asteraceae	Herb	Emergent
49	*Phyla nodiflora* (L.) Greene	Verbenaceae	Herb	Submerged
50	*Pistia stratiotes* L.	Araceae	Herb	Free floating
51	*Polygonum glabrum* Willd.	Polygonaceae	Herb	Emergent
52	*Rotala indica* Blatt. & Halb.	Lythraceae	Herb	Emergent
53	*Rotala rotundifolia* (Roxb.) Koehne	Lythraceae	Herb	Emergent
54	*Sagittaria sagittifolia L.*	Alismataceae	Herb	Emergent
55	*Scirpus articulatus* L.	Cyperaceae	Herb	Emergent
56	*Sphaeranthus indicus* L.	Asteraceae	Creeper	Emergent
57	*Trianthema portulacastrum* Linn.	Portulacaeae	Herb	Emergent
58	*Typha angustata* Bory and Chaub	Typhaceae	Herb	Emergent
59	*Urena lobata* L.	Malvaceae	Herb	Emergent
60	*Vallisneria spiralis* L.	Hydrocharitaceae	Herb	Submerged
61	*Xanthium strumarium* L.	Asteraceae	Herb	Emergent

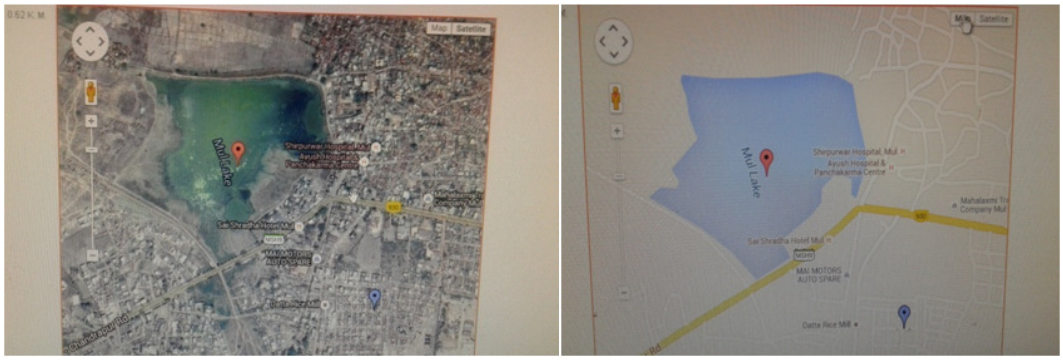

Figure .01. Map showing Mul Lake of Mul Taluka ,Chandraur District. (Photograph taken from Google map.)

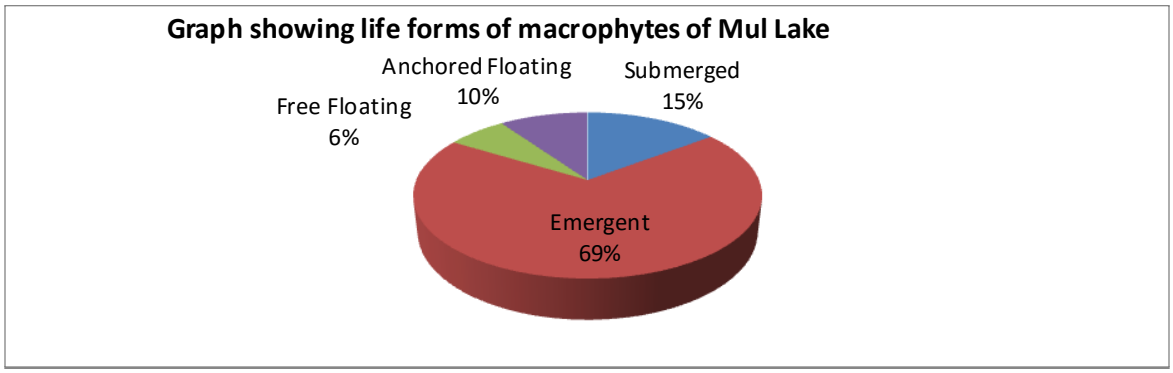

Figure .02. Graph showing life form of macrophytes of Mul Lake ,Chandrapur district.

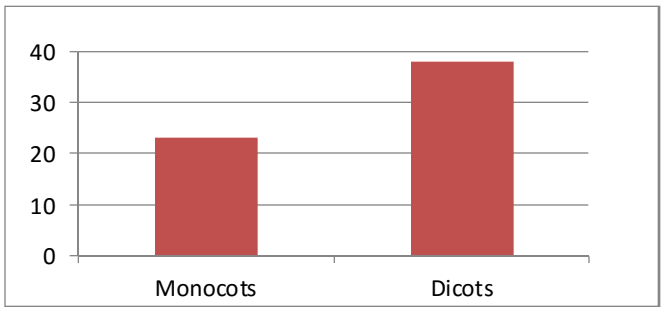

Figure .03. Graph showing Monocot and Dicot macrophytes ofMul Lake ,Chandrapur district.

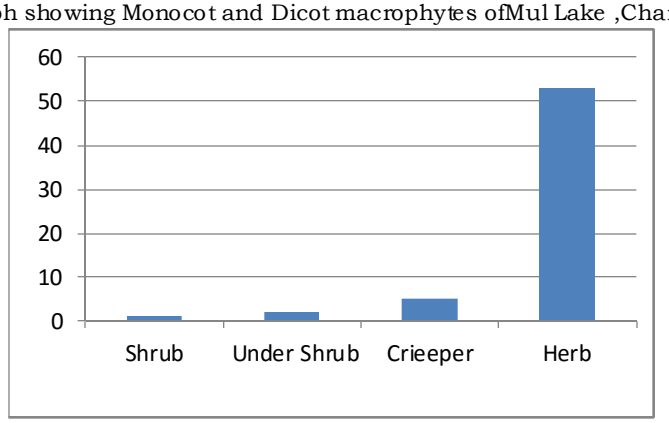

Figure .04 Graph showing habit of macrophytes of Mul Lake ,Chandrapur district.

Conclusion

Present survey of Mul lake shows 61 species of aquatic macrophyte diversity belonging to 32 families and 47 genera. Emergent macrophyte dominates and contributes 42 species(68.85%) ,followed by submerged macrophyte contributes 09 species (14.75%).Anchored floating macrophyte contributes 06 species(9.83%) and free floating contributes 04 species (6.55%). Floating macrophyte divides in two groups free floating and rooted floating. Herbaceous Macrophyte dominating and possess 53 species (86.88%) followed by creeper 05 species (8.19%), under shrub possess tow species of family Fabaceae and *Ipomoea carnea* Jacq. is the only shrub of Convolvulaceae family reported. Angiosperms shows dominance over Pteridophytes and Algae. Dicot macrophyte possess 38 species of 20 families (62.29%)and shows dominance over monocot possess 23 species of 12 families (37.70%). Thus Mul Lake possess much diversity of macrophyte .

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