

## Studies on Macrophytic diversity of two major water bodies of Ranchi, Viz. Ranchi lake and Kanke Dam, Ranchi, Jharkhand

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### ABSTRACT

Studies on macrophytic diversity were conducted in two major water bodies Viz. Ranchi Lake (Bada Talab or Vivekananda Sarovar) and Kanke Dam from April 2019 to June 2020. The study reveals the presence of 36 macrophytic species in Kanke dam and 17 macrophytic species in Ranchi Lake. In the present paper a list of all the macrophytic species is presented in tabular form.

Key words: Macrophytes, Bada Talab, Kanke dam, Ranchi

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### INTRODUCTION

These plants generate oxygen, provide physical structure, boost habitat complexity, heterogeneity and provide shelter to a variety of organisms such as fishes, invertebrates, and water birds etc. Macrophytes take possession of many kinds of aquatic ecosystems, like dams, lakes, reservoirs, wetlands, streams, rivers as well as. Primary productions of macrophytes often surpass the other aquatic primary producers. Macrophytes usually colonize shallow ecosystems where they become vital components and influences ecological processes and attributes of other aquatic attached assemblages e.g., species diversity. Macrophytes affect animal assemblages and promote biodiversity through a chain of mechanisms, related to habitat complexity, that involve the availability of shelter and feeding sites. Invasive macrophyte species may modify habitat structure and thus influence associated organisms. In this sense, they are suitable as the main focus of management strategies aimed at biodiversity restoration and conservation. As because their rate of biomass production is very high the saprophytes are primarily been characterised as a chief food source for aquatic organisms, providing both living and dead organic matter. In the present communication studies on macrophytic diversity has been conducted

in Kanke dam and Ranchi Lake. Kanke Dam which is one of the one of the biggest water bodies Ranchi, the state capital of Jharkhand. This is an important water bodies catering drinking water to more than 40 percent people of the city. This receives large amount of dirty water due to overflow of drains in rainy season. Whereas Ranchi lake is situated in the heart of the capital city. This Ranchi Lake is also called Bada Talab, presently it has been given name as Vivekanand Sarovar. Both these water bodies has been developed as tourists spots of the city. Both these water bodies harbors a number of macrophytic species.

Several workers have worked on various aspects of aquatic and semi - aquatic plants in different part of the country. Some authors also referred these plants in their floristic works such as Haines ( 1921-1925), Mooney (1950), Kachroo, (1959), Maheshwari (1960), Subramanyam (1962), Majumdar (1965), Jha (1965), Gupta (1979), Naskar (1990), Singh (1990), Cook (1996), Singh (1998), Christopher (2006), Mukherjee & Ghosh (1999), Mukherjee (2001), Mukherjee & Kumar (2003), Verma & Pandey (2007, 2008) and Mukherjee & Ghosh (2015), Mukherjee & Kumar (2019), Thomaz and Cunha (2010), Jaiswar, (2014).

## METHODOLOGY

Both the water bodies were visited extensively and through survey were conducted twice or thrice in every season to make the records of the macrophytes available in these water bodies. Considering the fragile nature of these aquatic macrophytes, extra care were given during removing the same out of water to keep them intact, and protect their significant taxonomic characters. Important characters like habit, color, height and association of the plants with other plants were written in the field only. Plants were dissected and fresh herbariums were pressed in the field herbarium press. Some plants were also kept in dilute solution of formaldehyde. Just after returning from the field, the plants were studied in the laboratory on the very same day. The field numbers were verified and flowers dissected and the plants were identified with the appropriate literature.

After proper identification and study, the plants were dried and pressed under heavy herbarium press. Before pressing, the plants were poisoned in 2% solution of Mercuric Chloride in rectified spirit. The specimens after drying were mounted with the help of synthetic resin adhesive and thread on the herbarium sheets of standard size (41.6 x 29.5). The plants are listed as per the classification system of Bentham and Hooker (1862-1883).

## RESULTS AND DISCUSSIONS

The intensive floristic survey of aquatic macrophytic diversity of Kanke Lake and Ranchi Lake of Ranchi were carried out during April 2019 to June 2020 has revealed 40 species of macrophytes. Out of 40

macrophytic species 36 belongs to Angiosperms, 1 belongs to Algae where as 3 species belongs to Pteridophytes. One species of Algae belongs to one family and one genus, 3 species of Pteridophytes belongs to two family 3 genus and 3 species. 36 macrophytic species distributed over 21 families.

Out of 36 Angiospermic macrophytes 21 are monocotyledons belonging to 11 genera and 10 families where as 15 macrophytes belongs to dicotyledons distributed over 15 genera and 10 families. Alphabetic lists of all the 40 macrophytic species have been given in Table -1.

The distribution of macrophytic species reflects that out of 40 species reported 38 species were reported from Kanke Dam, out of 36 Angiospermic macrophytes reported 35 were present in Kanke dam also 1 Algae and 2 Pteridophytes, where as in Ranchi Lake a total of 24 macrophytic species were reported out of that 21 were Angiospermic macrophytes, 1 Algae and 2 Pterdophytes.

The numbers of macrophytes were in Kanke dam as because the size of the Dam is quite large and is surrounded its three sides by big residential colonies and it receives large amount of waste water from the overflowing drainage and other anthropogenic activities. These waste water increases the nutrient load of the water bodies that favors the growth of the macrophytes. The excessive growth of macrophytes is the indicator of increased nutrient loads of the water bodies and reduced Dissolved Oxygen (DO) and increased Biological Oxygen Demand (BOD).

**TABLE 1- A LIST OF THE AQUATIC MACROPHYTES OF KANKE DAM AND RANCHI LAKE**

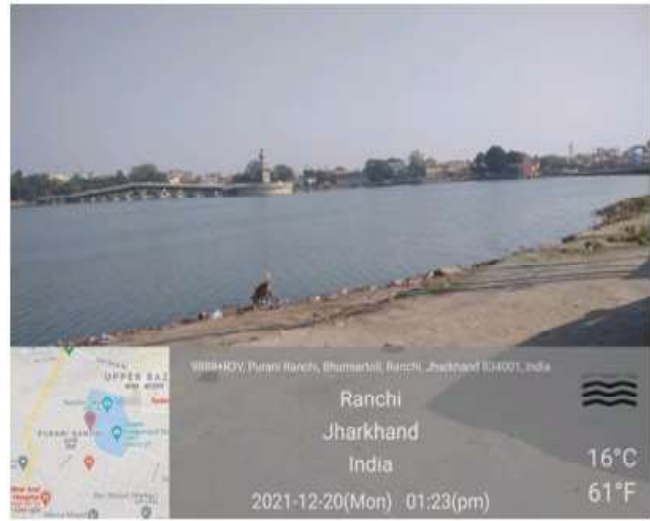
S.No.	Name	Family	Dicot/ Monocot	Flowering/ Fruiting time	Presence in the Kanke Dam	Presence in The Ranchi Lake
<b>ANGIOSPERMS</b>						
1	<i>Alternanthera philoxeroides</i> (Mart.) Griseb.	Amaranthaceae	D	April- Aug.	Y	Y
2	<i>Aponogeton undulatus</i> Roxb	Aponogetonaceae	M	July- Dec.	Y	Y
3	<i>Aponogeton natans</i> (L.) Engl. & K. Krause in Engl.,	Aponogetonaceae	M	July –Dec.	Y	N
4	<i>Ceratophyllum demersum</i> L.	Ceretophyllaceae	D	Sep.-Feb.	Y	N
5	<i>Cyperus rotundus</i> L.	Cyperaceae	M	June-Jan.	Y	Y
6	<i>Cyperus iria</i> L.	Cyperaceae	M	Aug.-Nov.	Y	Y

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7	<i>Eichhornia crassipes</i> (Mart.) Solms.	Pontederiaceae	M	April-Nov.	Y	Y
8	<i>Enydra fluctuans</i> DC.	Asteraceae	D	Dec.-March	Y	N
9	<i>Hygrorhiza aristata</i> (Retz.) Nees ex Wight. & Arn.	Poaceae	M	Aug.-Oct.	Y	N
10	<i>Hydrilla verticillata</i> (L. f.) Royle	Hydrocharitaceae	M	Nov.-Jan.	Y	Y
11	<i>Ipomoea aquatica</i> Forssk.	Covulvulaceae	D	Sept.-Feb.	Y	Y
12	<i>Ludwigia adscendens</i> (L.) H.Hara	Onagraceae	D	Whole year	Y	Y
13	<i>Lemna perpusilla</i> Torr.	Lemnaceae	M	May-Sept.	Y	Y
14	<i>Monochoria hastata</i> (L.) Solms	Pontederiaceae	M	July-Nov.	Y	N
15	<i>Monochoria vaginalis</i> (Burm. f.) Presl.	Pontederiaceae	M	July-Nov.	Y	N
16	<i>Nymphaea pubescens</i> Willd	Nymphaeaceae	D	Aug.-Nov.	Y	Y
17	<i>Nymphaea rubra</i> Roxb. ex Andrews	Nymphaeaceae	D	Aug.-Nov.	Y	Y
18	<i>Nelumbo nucifera</i> Gaertn.,	Nelumbonaceae	D	July-Nov.	Y	Y
19	<i>Nymphoides hydrophylla</i> (Lour.) Kuntze	Menyanthaceae	D	July-Nov.	Y	N
20	<i>Nymphoides indica</i> (L.) Kuntze	Menyanthaceae	D	Whole year	Y	N
21	<i>Nechamandra alternifolia</i> Roxb. Ex Wight Thwaites	Hydrocharitaceae	M	Aug.-Feb.	Y	N
22	<i>Ottelia alismoides</i> (L.) Pers.	Hydrocharitaceae	M	Sept.-Jan.	Y	N
23	<i>Perscaria glabra</i> (Willd.) M.Gomez	Polygonaceae	D	Oct.-March	Y	Y
24	<i>Perscaria barbata</i> (L.)H. Hara	Polygonaceae	D	Oct.-March	Y	N
25	<i>Potamogeton nodosus</i> Poir.	Potamogetonaceae	M	Oct.-March	Y	N
26	<i>Potamogeton crispus</i> L.	Potamogetonaceae	M	Oct.-March	Y	N
27	<i>Pistia stratiotes</i> L.	Araceae	M	May-Dec.	Y	Y
28	<i>Ranunculus sceleratus</i> L.	Ranunculaceae	D	Nov.- Feb.	Y	Y
29	<i>Rumex dentatus</i> L.	Polygonaceae	D	Nov.-Jan.	Y	Y
30	<i>Sagittaria trifolia</i> L.	Alismataceae	M	Oct.-March		
31	<i>Spirodela polyrrhiza</i> (L.) Schleid.	Araceae	M	April-Nov.	Y	Y
32	<i>Typha domingensis</i> pers.	Typhaceae	M	April-June	Y	Y
33	<i>Utricularia aurea</i> Lour.	Lentibulareaceae	D	Sept.-Feb.	N	Y
34	<i>Vallisneria spiralis</i> L.	Hydrocharitaceae	M	Nov.-March	Y	N
35	<i>Wolffia globosa</i> (Roxb.) Hartog & Plas	Araceae	M	July-Oct.	Y	Y
36	<i>Zannichellia palustris</i> L.	Potamogetonaceae	M	Oct.-March	Y	N
<b>ALGAE</b>						
1	<i>Chara globularis</i> L.	Characeae			Y	N
<b>PTERIDOPHYTA</b>						
1	<i>Marsilea minuta</i>	Marsiliaceae			Y	Y
2	<i>Azolla pinnata</i> R.Br.	Salviniaceae			Y	Y
3	<i>Salvinia molesta</i>	Salviniaceae			N	N



Ranchi Lake



Kanke Dam



Satellite image of Ranchi Lake



Satellite image of Kanke dam

## REFERENCES

- Amar Jaiswar, 2014; Comparative Biodiversity of Two Medium Reservoirs of North India. National Academy Science Letters
- Christopher, C. 2006. Study on the diversity of the aquatic vascular plants in Karikkakom, Thiruanantpuram. *Ecol. Env. & Conc.* 12(4): 661 - 663.
- Cook, C.D.K.1996. Aquatic and Wetland plants of India Oxford University Press, New York.
- Gupta, O.P. 1979. Aquatic weeds their menace and control. A text book and manual. Today & Tomorrow's Printers & Publisher, New Delhi.
- Haines, H.H. 1921 - 1925. The Botany of Bihar & Orissa. Adlard & Son & West Newman Ltd, London.
- Jha, U.N. 1965. Hydrophytes of Ranchi. *Trop. Ecol.* 6: 96 - 105.
- Kachroo, P. 1959. Aquatic vegetation of Damodar Valley. I. Phanerogamic flora of forest water ponds ,etc. *J. Asiat. Soc. Bengal.* 1: 271-289.
- Maheshwari, J.K. 1960 . The vegetation of marshes, swamps and riversides in Khandwa District (Madhya Pradesh) *J. Bombay Nat. Hist. Soc.* 51: 371 - 387.

- Majumdar N.C. 1965. Aquatic and semiaquatic flora of Calcutta and adjacent localities. *Bull. Bot. Soc. Bengal.* 19: 10 -17.
- Mooney, H.F. 1950. A supplement to the Botany of Bihar & Orissa. Catholic Press, Ranchi.
- Mukherjee P. and Ghosh T.K. 2015. Aquatic and Semi - semi aquatic angiospermic flora of Lohardaga (Jharkhand). *Phytotaxonomy* 15: 134-145.
- Mukherjee, P. Ghosh, T.K. & Sinha, S. 2006. Status of Economically important plants of Lohardaga. Proceeding XXIX Annual conference of Indian Botanical Society, Mohan Lal Sukharia University, Udaipur.
- Mukherjee and Kumar. 2020. Floristic Studies On Aquatic And Semi Aquatic Angiosperms Of Major Water Bodies of Jharkhand: *J. Indian Bot. Soc.* Vol. 100 (3&4) 2020.
- Mukherjee, P. & Kumar, P 2003. Studies on the angiospermic flora of ponds of Ranchi (Jharkhand). Proceeding National Seminar on Biodiversity, Taxonomy and conservation. Majalgaon College, Majalgaon,
- Mukherjee, P. 2001. The Floristic and Ecological studies of Aquatic Angiosperms of Lohardaga. Ph.D. Thesis, Ranchi University, Ranchi (Unpublished).
- Naskar, K.R. 1990. Aquatic & Semi-aquatic plants of the lower Ganga Delta. Daya Publishing House, Delhi.
- Singh, A. 1998. Floristic composition and vegetation profile of aquatic angiosperms of Hazaribag and adjacent area. Ph.D. Thesis, V.B. University Hazaribagh, (Unpublished).
- Singh, M. P. 1990. Floristic Studies on Aquatic And Semi Aquatic Angiosperms of Major Water Bodies of Jharkhand. *Hydrophytes of Ranchi J. Econ. Taxon. Bot.* 14 :3.
- Subramanyam, K. 1962. Aquatic Angiosperms. CSIR, New Delhi.
- Thomaz and Cunha 2010, The role of macrophytes in habitat structuring in aquatic ecosystems: methods of measurement, causes and consequences on animal assemblages' composition and biodiversity. *Acta. Limnologica Brasiliensia.* Vol. 22, no. 2, p. 218-236.
- Verma S.K. and Pandeya P. K. 2007. Ethnomedicinal use of some aquatic plants in Jharkhand. *J. Haematol & Ecotoxicol.* 2(1) 34-37.
- Verma, S. K. and Pandeya P.K. 2008. Floristic studies of Aquatic and Semi -aquatic Angiosperms of Ratu Maharaja Pond, Ranchi. Jharkhand. *Biospectra.* 2(1): 139-41.