

Diversity of Macrophytes Of Khamardih Pond Raipur (C.G.): Need for Sustainable Management

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Abstract: Aquatic macrophytes both flowering and non flowering confine themselves to the shallow eutrophic zone of the water bodies. They play an important role in providing food to fish and to other aquatic animals. The study of macrophytes is important in order to understand the functioning of aquatic ecosystem. Most of the aquatic macrophytes may become a nuisance, when growing profusely. The Physico-chemical parameter such as temperature, PH, dissolved oxygen, turbidity, conductivity, total alkalinity determined during seasons. Analysis was done according to the standard method of Trivedy and Goel (1984), APHA, AWWA and WPCF (1985). Algae were identified the relevant Monograph (Hustadt 1930, Pochman 1942, Desikachary 1959). Whereas *ceratophyllum demersum* L, *Pistia stratiotes* L., *Hydrilla verticillata* L, *Spiranthes indica*, *Euphorbia* spp., *Ipomea obscura*, *Amaranthus* spp., *Marsilea minuta*, *Eichhornia*, *Jussiaea repens*, *Cyprus rotundus*, *Utricularia stellaria* L., are found in Khamardih pond. Aquatic weeds infestation in the fish ponds causes several problem like Check fish movement and restrict their living spaces, Prevent sunlight penetration to the water bottom which also reduces the productivity by depletion of valuable nutrients or by shading, Lowering down the DO level in the water, Give shelter for fish pathogens parasite and serves as a ideal haunts for predatory animals, weed fishes, harmful molluscs and water insect and the decayed aquatic weeds release a noxious and unhygienic gases, resulting eutrophic condition.

Key Word: Macrophytes, Microphytes, Khamardih pond, Water

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I. Introduction

Raipur is the capital of the Chhattisgarh and administrative headquarter. It was formerly a part of Madhyapradesh before the state of Chhattisgarh was formed on First November 2000. At the time of the 2011 census, the population within the municipal corporation area of Raipur was 1,010,087. Raipur city is situated between 20°-21N to 21°-31 n Latitude and 81° 32E to 81°43 and With an elevation of 304.8m. The climate of Raipur is warm and the maximum temp. in may reaches upto 47°C, relative humidity is about 75% & rainfall is 1238mm. There is about 40 ponds and tanks. Out of the 40 many of ponds had been reclaimed in which some have highly eutrophic, stabilization pond. In most of the ponds of Raipur sewage and sullage from the city is being discharged. In successional stages the unicellular and filamentous algae flora are the first species to appear. most of the aquatic plants normally starts their lives in or under the water, as they need solar radiation for their growth and development, they are normally limited to shallow water from where they grow towards the surface and used to produce the floating foliages. while some of them grow completely under submerged condition throughout their life cycle, only during the flowering stages some of them come out above the water surface. Their habitat under the water column is very much diverse; generally they grow and anchor in the muddy silty bottom. most of these aquatic macrophytes intake the nutrition through their roots or root hair but some of the species also intake nutrition through their leaves, some of other different forms of the aquatic angiosperm were also recorded such as amphibians plants, macrophytoplankton free floating forms, wet land species and the swampy species all these species grow vegetative or by the seeds but during adverse condition with the help of vegetative bud or rhizomes. After attaining the favorable condition these weeds again start their lives therefore it is very difficult to eradicate these aquatic plants by single efforts.

Eichhornia Crassipse (water hyacinth) *Parthenium hysterophorus* (carrot grass) are highly troublesome introduced or alien weed in India. Many alien weed become aggressive as to fast displace the indigenous flora of the new ecosystem. They are called Invasive Alien Weed (IAW). In other word IAW threaten the native biodiversity of the area. The dissolve nutrients minerals substance and water quantities directly influence the growth of aquatic weeds. Aquatic plants grow faster as the supply of dissolve CO₂ in the water. The most important environmental factor for the aquatic flora is solar radiation. Temp. ranges between 20c to 35c aquatic plants grow faster by vegetative budding and during winter and frost several of these plants die up and start decomposition.

In floating aquatic plants are having much air space i.e. aerenchyma tissue spongy in nature which helps in floating.

The rooting system of agriculture plants are rhizomatous or swollen and deep sunken so that these can survive in the dry season or on adverse climatic condition. The foliar structure are mostly linear flat serrate long and spreading so that the water flow would not affect these plants. Water plants are also an indispensable part of all aquatic population due to their high adaptability. Aquatic life includes benthic organisms, inhibiting the bottom sludge, plankton living in bulks and organisms developing in the surface layer of water, underground part of plants attached to bottom stones rather object are covered with growths in the form of crusts, pads, and bushes whose color varies depending on the composition of water plants from underwater meadows, in water bodies rich in salts of calcium. The growth of water weeds is often very intense and the water is said to bloom. Water bodies polluted with organic matters of plant and animal origin are good medium for the development of protozoa. Protozoa feed on bacteria and suspended matter.

II. Material Methods:

Khamardih pond is spread over in 13 acre area. It is quite an old pond. The pond water is green. Earlier it was famous as “Khamardih Bandhwa Pond”. It was renewed in 2000 by Parsad Sanjay Shrivastava and it was named **Dr. Shyama Prasad Mukherji Sarovar**. This pond comes under Shree Ram Nagar face-1. Pond is 10-15 ft deep. At the coastal area of the pond several temples are present i.e. Shitala Mandir, Radha Krishna Mandir, Shankar Mandir and Sai Mandir under construction. Other than this pond, there is another pond situated near to it, which is only used for buffaloes. The physico-chemical parameter such as temperature, pH, dissolved oxygen, turbidity, conductivity, total alkalinity determined during seasons. Analysis was done according to the standard method of Trivedy and Goel (1984), APHA, AWWA and WPCF (1985). Algae were identified the relevant Monograph (Hustadt 1930, Pochman 1942, Desikachary 1959). 1999. Sample were collected and preserved in formalin. The plants were collected from May 2015 to March 2016.

We collected aquatic plant seasonally by three ways -

1. We walked along the edge of pond as far as possible.
2. We look the help of local divers and fisherman for collecting the fully submerged plants.
3. We followed zigzag pattern of the rowing the boat to cover more area in minimum time of collecting specimens.

Specimens were identified taxonomically with help of Monographs taxonomic revision & floras (C. D. K. Cook et al 1974, Kumudranjan Naskar, 1990, Sinha S. & Naik M.L. 1997, T. Pullaiah 2000, Donald D. Cox et al, (2000), Pullaiah (2003)

III. Some Aquatic Macrophytes

Pistia stratiotes (water lettuce), Family-Araceae

Leaves broad, lettuce like blades on a short, thick stem that bears numerous, fine roots; stems proliferating by stolons and giving rise to secondary rosettes. Plants sometimes stranded on muddy shores. It is also called as 'Water Lettuce'.

***ceratophyllum demersum* L.**, Family ceratophyllaceae

Polymorphic species and almost cosmopolitan in distribution. Roots absent but branches sometimes modified as 'rhizoids'. Stems branch but not more than one branch at a node. . Totally submerged, rootless and free-swimming. Large populations may be troublesome and blocking or constricting water channels.

Juncus prismatoearpus, Family-Juncaceae

An erect about 1m tall of, clump forming herb, it is often mistaken for a grass or sedge. Inflorescence small, compact attached to one side of shoot about 8-15cm below the tip, common habitat bank, ditched, shore line and swamps.

***Marsilea quadrifolia*,**

Small fern of shallow water and shore lines possessing subterranean 50-100 cm long stolons. Leafy buds guaternate, borne on 80cm long, erect petioles, commonly found in ditches ponds and paddy fields.

Najas Minor

Annual submerged brittle monvecias herb with 20-30 cm long thin stem leaves narrow linear 1-2cm in length divided into sickle shaped 6-10 pairs of teeth. Flower unisexual fruit wrinkled cylindrical achenes. A weed shallow stagnant water and shore line.

***Typha angustifolia* L.** Family-Typhaceae

Perennial robust 1-3cm tall plants of shores marshes ditches stem stout without nodes spongy arising from subterranean rhizomes finger thick cylindrical pale fleshy leaves flat sheathing linear 6-23mm wide spike 15-30cm long drumstick like upper half portion filled with staminate flower with contiguous dark brown pistillate flower in lower portion, fruit about 1cm long provided with copious hairs for dispersal.

Genus- *Commenlia*, Family-*Commenlinaceae*

Mostly herbs. Roots fibrous or tuberous. Stems erect to creeping, often rooting at nodes and nodes usually swollen. Mostly perennial but some are annual. Many species grow in damp and shady places but relatively few are wetland plants. Some members are used locally as medicine.

Genus: *Ipomoea*, Family: Convolvulaceae

Stems erect, twining or floating. Leaves petiolate; blades variable, cordate or sagittate to triangular or rarely linear. Inflorescence axillary, one to few-flowered and cymose. Sepals persisting but not enclosing the fruit. Petals funnel-shaped and glabrous outside. Fruit a thin-walled

Genus: *Nymphoides*

Annual or perennial, some rhizomatous and some with banana-shaped root tubers. Leaves with orbicular or cordate blades, with crenate margins, floating at the surface on long, slender petioles arising from either a slender, erect stem or form a horizontal rhizome, veins branching and then recurved *ko* unite with one another, the upright stem giving rise to roots at the base of the leaf petioles. Flowers solitary or in clusters arising from the erect stem and supported by floating leaves. Sepals triangular and petals white or yellow and mostly fimbriate inside. Tubers of some species used as food, locally used as medicine and some are cultivated for ornament also. The Macrophytes species occurred in the reservoir during year 2015-2016 listed.

***Hydrilla verticillata* L., Family: Hydrocharitaceae**

Leaves in whorls of three or more, arranged in regular and repeating patterns along elongated stems; squamulae intravaginales

IV. Result And Discussion

In the present study, *Typha angustifolia*, *ceratophyllum dimersum*, *Pistia stratiotes* is present in all season. *Cyperus rotundus* is present in rainy and winter season. *Ipomoea aquatica* is present in summer season., *Ipomea carnea*, *Lemna*Spp,*Spirodella* sps, *Pistia stratiotes* are generally dominates in sewage water system and large no of other weed can also grow fast in these sewage water,

Whereas *ceratophyllum demersum* L, *spiranthus indica*, *Euphorbia* spp,*Ipomea obscura*, *Amaranthus* spp,*Marsilea minuta* ,*Jussiaea repens*, *Cyprus rotundus*, *Utricularia stellaria* L., are found in Khamardih pond.

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Aquatic weeds Infestation in the fish ponds causes several problem like

- 1) Check fish movement and restrict their living spaces
- 2) Prevent sunlight penetration to the water media bottom soil which also reduces the productivity by depletion of valuable nutrients or by shading.
- 3) Impending oxygen circulation and helping gradual silting up the ponds.
- 4) Lowering down the DO level in the water
- 5) Give shelter for fish pathogens parasite and serves as a ideal haunts for predatory animals,weed fishes,harmful molluses and water insect. The decayed aquatic weeds release a bnoxious and unhygienic gases,resulting eutrophic condition.
- 7) Affect fishing operation
- 8) Hamper fish stock manipulation and desired feed application

In the weed instead waters,several noxious algal flora are developed which prevent the growth of more useful organism and often causes fish morlatiy by depletion or by liberation of phytotoxin during their decomposition. *Ipomea carnea*,*Lemna* spp,*Spirodella* sps, *wolffia arrhiza* are generally dominates in sewage water system and large no of other weed can also grow fast in these sewage water, Depending upon the water quality & depth of water some aquatic grasses are sps,*Typha* ,*Cyperus rotuntus* ,*Nuymphae* sps, *Pistia* sps, *vallisnaria* sps, *Lemna* sps are infested throughout the year. Aquatic plants contribute to maintaing biodiversity in fresh water ecosystem . population explosion , urbanization and developmenttrust & recreation creates lots of problem of ecosystem of biodiversity.Macrophytes give platform for fish production and beneficial for human society.

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OBSERVATION TABLE:

SN _o	COMMON NAME	NAME OF PLANTS	CATEGORY/HABIT	FAMILY	KHAMARDI H POND
1	Water lettuce	<i>Pistia stratiotes</i>	Free floating	Araceae	++
2	Water primrose	<i>Jussiaea repens</i>			+++
3	Four leaf clover	<i>Marsilea minuta</i>	Shoreling and ditch, pond	Marsileaceae	++++
4		<i>Scirpus supinum</i>	Shoreline, Shall ow water and semiaqua		+
5	Knotgrass	<i>Polygonum glabnum</i>	Swamp and marshland	Polygoniaceae	+
6					
7	CommomDuck weed	<i>Lemna spp.</i>	Free floating	Lemnaceae	+
8	Water thyme	<i>Hydrilla verticellata L</i>	Submerged hydrophytas	Hydrocharitaceae	
9		<i>Eclipta alba</i>	Emergent	Compositaceae	+
10		<i>Dentalla repens</i>	Marshy and mud	Rubiaceae	+
11	Indian marshweed	<i>Limnophila racemose</i>	Submerged	Scrophulariaceae	+
14	Water spinach	<i>Ipomea aquatica</i>	EM	convolvulaceae	
15	Umbrella sedge	<i>Cyperus rotundus</i>	EM	Cyperaceae	+
16		<i>Juncus spp.</i>	EM	Cyperaceae	++
17		<i>Klinga triceps L.</i>	EM	Gramineae	++
18		<i>Barleria prino itis</i>	EM	Acanthaceae	
19		<i>Amaranthus spp.</i>	EM	Amaranthaeae	++
20	Coon tail	<i>Ceratophylla dimersum L.</i>	Submerged	Araceae	++
22					
23					
24		<i>Altermanthera philoxeroides (mart)</i>	EM	Compositaceae	+
25	Gajar graee	<i>Parthenium hysteropumhorus</i>	EM	compositaceae	+
26		<i>Abutilon indicum</i>	EM	Malvaceae	+++
27	Chras/ Ganja	<i>Cannabis indica</i>	EM	Cannabinaceae	++
28	Tinpatia bhagi	<i>Oxalis</i>	Free floating		++++
29	Bathua sag	<i>Chenopodium album</i>		Chenopodiaceae	++

PLATES

<p>Khamahardin pond</p> 	<p>Khamahardin pond</p> 
<p><i>Utricularia</i></p> 	<p><i>Ipomea obscura L</i></p> 
<p><i>Typha angustifolia</i></p> 	<p><i>Ceratophyllum</i></p> 
<p><i>Cyperus rotundus</i></p> 	<p><i>Abitulon</i></p> 

	
<i>Cannabis indica</i>	<i>Brecheria</i>
	
<i>Pistia</i>	<i>Spiranthis indica</i>
	
<i>Portuloca pilosa</i>	<i>Barleria pinoitis</i>

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