

Diversity of Hydrophytes of Sen Pokhar of Nonihat, Dumka

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ABSTRACT

The Hydrophytes occur mainly in the shallow regions of lakes, ponds, marshes, streams and rivers etc. Hydrophytes are important components of lentic ecosystem. Aquatic plants provide shelter and breeding place for aquatic animals and maintain the integral balance of ecosystem. They are the primary producers and contribute dissolve oxygen (DO). The study of the Diversity of Hydrophytes being diverse, Hydrophytes have been grouped into four general categories, submerged, emergent, floating and wet land. In the present study, it has been conducted into the Sen Pokhar, situated at Nonihat of Dumka district, Jharkhand. This is a perennial rectangular pond. It is about 150m in length, 125m in width and about 10m in depth. It is fed by the running rain water. Biologically it is a fresh water aquatic lentic ecosystem. Their populations were highest in summer season, mainly in the month of May, while they showed lowest population during rainy season particularly in the month of September.

Keywords : Diversity, Hydrophytes, Sen Pokhar, Dumka.

INTRODUCTION

Hydrophytes are important components of lentic ecosystem. Aquatic plants provide shelter and breeding place for aquatic animals and maintain the integral balance of ecosystem. They are the primary producers and contribute dissolve oxygen (DO). All organisms need the oxygen for survival. The study of the Diversity of Hydrophytes being diverse, they, belong to four categories, on the basis of their habit - submerged, emergent, floating and wet land.

A. FLOATING HYDROPHYTES

Three types of plants are incorporated in this group of hydrophytes :

1. Free Floating :

These are the plants which are not attached with the soil. They remain free floating on the surface of water and are in contact with air and water only. These plants are common in the Jheels, Ponds, ditches, Canals etc. for e.g., *Eichhornia crassipes* (Mart.)

Solms, *Lemna perpusilla* Torrey, *Pistia stratiotes* L., *Spirodela polyrhiza* (D) Schleid., *Trapa natans* L. and *Wolffia globosa* Roxb.

2. Attached hydrophytes with floating shoots :

These plants are attached to the muddy substratum by their roots but their shoots come out and float on the surface of water e.g, *Alternanthera philoxeroides* (Mart.) Griseb., *Hygroryza aristata* (Retz.) Nees, *Ipomoea aquatica* Forsk., *Ludwigia adscendans* (L.) Hara and *Neptunea oleracea* Lour.

3. Attached hydrophytes with floating leaves :

These plants are attached to the muddy floor. Their stems remain under water in contact with soil and water, while the leaves float on the surface of the water. For e.g. *Aponogeton natans* (L.) Engl. & Krause, *Butomopsis latifolia* (Don) Kunth, *Caldesia parnassiifolia* (Linn.) Parl., , *Monochoria vaginalis* (Burm. f.) Presl, *Nelumbo nucifera* Gaertn., *Nymphaea* spp., *Nymphoides hydrophylla* (Lour.)

Kuntze, *N. indica* (L.) Kuntze, *Sagittaria sagittifolia* L., *Ottelia alismoides* (L.) Pers., and *Potamogeton nodosus* Poir.

B : SUBMERGED HYDROPHYTES

These are the group of plants which always remain under the water surface and are grouped into two categories.

1. Suspended submerged hydrophytes :

The plants which remain submerged in the water but have no contact with the soil. Their flowers may or may not come above the water level. For e.g. *Ceratophyllum demersum* L. *Utricularia aurea* Lour etc.

2. Attached submerged hydrophytes :

These plants remain in contact with soil and water. Their vegetative portions remain completely submerged in water, While the flowers may or come out of the surface of the water for e.g. *Hydrilla verticillata* (L.f.)Royale, *Aponogeton crisspus* L. *Myriophyllum tuberculatum* Roxb. *Najas graminea* Del *Nechamandra alternarifolia* Roxb. etc.

C. Emergent Hydrophytes

Plants which remain attached with the soil surface, covered with water but their most of the vegetative parts remain out of the water surface for eg. *Celosia argentea* L., *Coix lacryma-jobi* L., *Corchorus capsularis* L., *Crinum defixum* Ker-Gwal., *Cyathocline purpureus* Kuntze, *Cyperus* spp., *Dopatrium junceum* (Roxb.) Buch.-Ham. Ex Benth., *Echinochloa colonum* (L.) Link, *E. crusgalli* (L.) Beauv., *Eleocharis* spp., *Enydra fluctuans* Lour., *Eriocaulon* spp., *Fimbristylis* spp., *Hydrolea zeylanica* (L.) Vahl. *Hygrophila auriculata* (Sch.) Heine, *H. polysperma* (Roxb.) Anders., *Limnophila indica* (L.) Druce, *Ludwigia* spp., *Phragmites karka* (Retz.) Trin. ex Steud., *Ranunculus sceleratus* L., *Rumex dentatus* L., *Rotala* spp., *Sagittaria saggitifolia* L., *Schoenoplectus* spp., *Sphaeranthus indicus* L., and *Typha angustata* Chaub.

(D) Wet Land Hydrophytes (HELOPHYTES)

This category includes the plants rooted to the soil saturated with water, which may also survive in dried

conditions too, in the later part of their life cycle. A large number of species fall under this category e.g., *Alternanthera paronychioides* St.-Hill., *A. sessilis* (L.) R. Br. Ex DC., *Caesulia axillaries* Roxb., *Canscora diffusa* (Vahl) R. Br. *Centella asiatica* (L.) Urban, *Commelina* spp, *Drosera burmannii* Vahl., *Eclipta alba* (L.) *Heliotropium* spp., *Hoppea dichotoma* Heyne ex Willd., *Lindernia* spp. *Mecardonia procumbens* (Mill.) small, *Merremia gangetica* (L.) *cutoa.*, *Medicago* spp., *Lobelia alsinoides* Lamk., *Phyla nodiflora* (L.) Greene, *Polygonum plebejum* R. Br., *Potentilla supine* L. and *Cochlearia cochlearioides* (Roth) sant. & Mahesh.

MATERIAL AND METHOD

The sampling of the water of Sen Pokhar of Nonihat, Dumka district was done at monthly intervals from March 2012 to February 2013 for the study biological parameter of Hydrophytes. Monthly samples were taken from the surface and sub-surface. Samplings were done in the morning hours between 8:00 to 12:00 noon, throughout the study period. Three samples were taken directly in plastic bottles by using laboratory sampler.

The Hydrophytes were sampled by using a 0.5 x 0.5m² metal quadrat (South Wood, 1978). Five random quadrat samples were taken from each site which were composited and brought to the laboratory in the polyethylene bags. In the laboratory all samples were washed with tap water and sorted manually and then identified following Gupta (1979).

RESULTS AND DISCUSSION :

Hydrophytes of Sen Pokhar belonged to four main groups, Algae, Pteridophyta, Dicotyledons and Monocotyledons. Hydrophytes showed a well marked seasonality. Some species were present throughout the year but some were present only in certain months.

During the entire period of study, there were altogether 19 genera and 21 species in hydrophytic community. Hydrophytic communities were dominated by angiosperms. There were 16 genera and 18 species of angiosperms. Angiosperms were followed by pteridophytes with two genera and two species. Algae had lowest one genus and one species.

Algae

Algae were represented by lone genus *Chara* with lone species *C. zeylanica*. Its density was 119 which were 11.11% of total macrophytic population during the study period. The average population was 10.42, however, it was absent in June to September. It was observed that *Chara* showed two peaks annually, major peak in May and minor peak in December.

Pteridophytes

Pteridophytes were represented by two genera *Azolla* and *Marsilea*, each having single species. Total population of pteridophytes was 208 which were 19.42% of the total macrophytes in the study period. The highest population 132 was of *Marsilea* spp. which was 63.46% population of total pteridophytes. *Marsilea* was followed by *Azolla* spp. with 76 populations, which were 36.53% of pteridophytes population.

It was found that Pteridophytes showed a distinct pattern of growth. *Marsilea* and *Azolla* were absent in rainy season. They showed two peaks annually, major peak in March and minor peak in December for both the years.

Angiosperms

Among, angiosperms were most dominant group in Sen Pokhar, during the period of investigation. Angiosperms were represented by two sub groups - dicotyledons and monocotyledons.

Dicotyledons

During the course of study, dicots were represented by five genera and six species. Among the dicots most dominant genus was *Utricularia* with two species.

The total populations of dicots were 154 which were 14.38% of the total Hydrophytes. In the study period, the most populated genus was *Alternanthera* spp. having 62 units which were 40.26% of total dicots. It was followed by *Jussiaea* spp. with 40 units, which were 25.97% of the total dicots. The least populated genus was *Ipomea* spp. with 10 units which were 6.49% of total population of dicots.

The average population during the study period was 14.88%. They showed very poor population from June to September in both the years. Dicots showed

two peaks, major peak in February and minor peak in December.

Monocotyledons

Among hydrophytes, the most dominant group was monocots. Monocots were represented by 11 genera and 12 species. Among monocots the most dominant genus was *Potamogeton* which had two species, rest genera had only one species. The total populations of monocots were 590 which were 55.09% of total macrophytic population. In the study period the most populated genus was *Hydrilla* spp. with 132 populations which were 22.37% of total monocots population. It was followed by *Lemna* spp. with 115 units which were 19.49% of total monocots. The most poorly population genus was *Sagittaria* spp. which had five units, which were 0.85% of total monocots population. The average population of monocots during the study period was 49.43%. It was observed that monocots showed a definite pattern of population during the entire study period. They had luxuriant growth in winter and poor growth or no growth in rainy season. However, *Scirpus* spp. was present throughout the study period. Monocots showed two peaks annually, major peak in February and minor peak in December.

Hydrophytes exhibit great variability in tolerance to various pollutants, hence, they serve as bio-indicators. Some of the macrophytes also serve as bio-accumulators of the heavy metals of the water bodies (Carpenter and Adam, 1977). However, excessive growth of water weeds is responsible for deterioration of water quality. The macrophytes present in fresh water ecosystem play an important role in primary production. In the present investigation, all types of emergent, submerged, attached floating and free floating aquatic plants have been recorded. In Sen Pokhar, the occurrence of different macrophytes had been observed to vary with the season as well as with experimental sites. During the present study, a large number of hydrophytes were recorded. Some of them were present throughout the year while, some were present in particular season. In the present investigation, macrophytes communities comprised of algae, Pteridophytes and Angiosperms. There

were altogether 19 genera and 21 species. During the present study, the population density of macrophytes was highest during late winter and early summer and lowest during rainy season.

During the present study the macrophytic population of Sen Pokhar was dominated by Monocots with 11 genera and 12 species. Monocots were followed by Dicots with five genera and six species and Pteridophytes with two species. Poorly recorded community was of Algae with only genus and species. The members of Monocots showed their maxima during the March. They showed two peaks annually, major peak in February-March while, minor peak in December. This may be due to the optimum temperature, high value of transparency, low value of free CO₂, high value of nutrients, Calcium and nitrates. In the present study the members of Dicots showed their maximum population density during winter and lowest in rainy season. They also showed two peaks annually, major peak in February and minor peak in December. This might be due to the high transparency, optimum value of inorganic and organic nutrients and optimum temperature. In the present investigation, Pteridophytes showed two peaks annually, primary peak in late winter and secondary peak in December. Pteridophytes, like Monocots and Dicots, showed similar pattern of growth and seasonality. Algae were represented by their lone genus *Chara* with lone species *C. zeylanica*. *Chara* showed its minimum population density

during summer, lowest during winter and remained entirely absent during rainy season. This high value of population density, may be due to the preference of *Chara* to low temperature of water, high value of transparency.

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