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MACROPHYTIC AND MICROPHYTIC: A STUDY OF DIVERSITY IN THE DAMS OF JASHPUR DISTRICT CHHATTISGARH

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ABSTRACT

The diversity of aquatic macrophytes that can be found in the various ponds that are located in the Jashpur District Chhattisgarh, which is located in the state of Chhattisgarh, is the primary subject of the study that is now being conducted. Macrophytes make their natural habitat in ponds, rivers, lakes, and other bodies of water. Macrophytes are common components of any ecosystem that includes water. It is not feasible to place an adequate amount of importance on the role that aquatic macrophytes play in the efficient functioning of ecosystems that contain water. The diversity of aquatic macrophytes and the role that this diversity plays in providing a better understanding of the dynamics of wetland ecosystems are both of great significance to this discussion. Also of great significance is the role that this diversity plays in providing a better understanding of the diversity of aquatic macrophytes

Keywords: *Aquatic macrophytes, Emergent, Free floating*

INTRODUCTION

The macrophytes that are a part of the aquatic vegetation of a lake each play an important role in the ecosystem of the lake. The state of Chhattisgarh is well-known for its extensive, everlasting, and freshwater bodies of water that take the form of lenticular basins. Large aquatic plants, also known as "aquatic macrophytes," are an essential source of food, habitats, fodder, herbal medicine, and materials for domestic home use for the people who live in the areas surrounding it. Aquatic macrophytes are also referred to in common parlance as "aquatic macrophytes." A broad range of aquatic creatures make use of the weeds that grow in the water in some capacity, whether it is for obtaining food or as a place to live. Weeds in the water are a natural component of the aquatic ecosystem. [1] A good number of individuals find aquatic plants to be not only interesting, but also rather gorgeous in their own right.

Microphytes

Microphytes are a kind of planktonic algae that are extremely small and may exist as either unicellular or multicellular organisms. They are widespread across the world's aquatic ecosystems (fresh, estuarine and marine). They are classified as either filamentous algae or

planktonic algae, both of which are subgroups of algae. Uniseriate filamentous algae can seem like a long chain, thread, or filament if they are grown in the right conditions. Because of the way that these chains, threads, and filaments get entangled with one another, a mat that looks very much like wet wool is produced as a result of this process (1). Algal blooms and pond scum are two names that are occasionally used to refer to these types of growths. On the other hand, planktonic algae, which are often referred to as phytoplankton, are microscopic plants that are free to float in water. Depending on whether they are unicellular or multicellular, algae can live on their own, in colonies, in chains, or in groups of various sizes and shapes (2). Depending on the species, their length can range anywhere from only a few micrometres (m) to one hundred micrometres in length. These types of microorganisms are sometimes referred to in common parlance as "green water algae" or "pea soap algae." Phytoplankton are able to carry out the process of photosynthesis despite the fact that they do not have any roots, stems, or leaves. They do this by cultivating themselves in a photoautotrophic manner and utilising carbon dioxide as a source of food [2]. This allows them to produce approximately half of the oxygen that is present in the atmosphere.

However, just like any other naturally occurring species, they have the ability to interfere with the activities of people, either due to the fact that they are present or because of the large number of them that are present. The plants in issue are referred to as "weeds" when this circumstance arises, and it is important to have some control over them. In an aquatic environment, a person is likely to find several types of macrophytes, which may include plants that are free-floating, submerged, or emerging from the water [3]. Free-floating macrophytes have roots that are not attached to the substrate, therefore their leaves and roots are both able to float independently of the medium. When it comes to the process of extracting nutrients from the water, the roots of the free-floating aquatic plant known as Eichhornia crassipes play a significant role. Aquatic plants are among of the most common and widespread forms of plants that may be found anywhere in the world [4].

Macrophytes

According to the findings of current study, macrophytes can have an effect that is both positive and destructive for aquaculture. As the seasonal accumulation of plant biomass proceeds, the influence of this phenomenon becomes more obvious. In addition to providing water for domestic consumption, the lake is an essential source of water for a variety of resource-based activities and purposes, such as irrigation, fish and trapa farming, and other applications. Higher water levels, a rise in the number of plants that float on the water's surface, and an increase in the amount of water lost to evaporation and transpiration are all the results of plant biomass displacing part of the canal's cross sectional area [5]. The fact that macrophytes have an influence on the population structure of aquatic creatures in addition to influencing the diversity and composition of a number of different aquatic macrophytes is a fact that is unconnected to the ongoing argument [6].

On the other hand, the growth of these plants has a negative impact on the productivity of aquaculture due to the fact that they consume the nutrients that are already present in the water body, disrupt the generation of plankton, and obstruct the passage of sunlight [7]. In addition, the passage of sunlight is disrupted by the presence of these plants. It is common knowledge that the macrophytes in the lake have a detrimental effect on the population of the lake's planktonic organisms due to the presence of the macrophytes. This can take place either as a result of a shedding effect brought on by the surface area coverage or as a direct result of a rapid growth rate that brings about a nutritional deficiency. The ecology of the region's fresh water is an important but often overlooked aspect of the region's geography. These networks provided habitats for a diverse range of animal and plant species, including, amongst others,

fish, birds, and insects [8]. A healthy ecosystem is the outcome of the interaction of these characteristics with the physical reality of the environment. In such an ecosystem, plants provide other species that live in the water and the surrounding region with a source of food and a refuge from the elements [9].

In the tropical lagoon that he described, he gave a report on the limnological factors as well as the nutritional content of the submerged aquatic macrophytes. The elemental composition (carbon, nitrogen, and phosphorus), as well as the carbohydrate, protein, and fat content of aquatic macrophytes, may be determined with the use of these factors. The study that was conducted by Albertoni et al. (2014) lasted for a period of thirteen years and focused on field evidence of the effect that aquatic macrophytes have on the quality of the water in a shallow eutrophic lake[10]. According to Gaikwad and Kamble (2014), who carried out a qualitative investigation of the surface water of the Panchganga River, the typical aquatic ecology has created a setting that is unfavourable for the growth of aquatic flora and fauna. This makes it more difficult for aquatic flora and fauna to flourish. Sipauba-Tavares and her colleagues looked into the effect that floating macrophytes have on the water quality in fish ponds. Their findings showed that these plants had a significant impact (2013). He asserts that in addition to extracting nutrients from the water, aquatic plants also play a part in the transformation of nutrients through the coordination of a large number of physical, chemical, and microbiological processes. The research that was carried out by Pereira et al., (2012) focused on aquatic macrophytes as possible indicators of water quality in subtropical shallow lakes.

OBJECTIVE OF THE STUDY

1. To study macrophysics and microphysics diversity in the dams.
2. To study Aquatic macrophytes and microphysics.

MATERIALS AND METHODS

The territory around the marsh that was the focus of this inquiry is known to have a number of agricultural establishments in addition to a few canals that are used for irrigation. These canals transport water from the marsh to the cultivated land, where it is used to irrigate rice fields and citrus orchards [12], [11]. Due to urbanisation and other forms of human activity, the Dams Of Jashpur District Chhattisgarh wetland is steadily shrinking in size. In the past, the total surface area of the wetland was more than 100 hectares, but now it is significantly smaller than that. Because of this, the wetland is becoming an environment that is less hospitable to a wide diversity of plant and animal species. The ombrothermic diagram of the region that was investigated was developed with the use of climatic data that was acquired from the Chhattisgarh meteorological station [13].

DATA ANALYSIS

In the course of this particular piece of research, the Jashpur District Chhattisgarh wetland was investigated, and a total of 102 unique species of vascular plants and 63 unique genera of fresh water algae were discovered there. There are 39 different families and 80 unique genera that make up the kingdom of vascular plants. [14]. [15] There are 73 species of dicotyledonous plants, 28 species of monocotyledonous plants, and one species of pteridophytic macrophytes that belong to this genus of plants. Regarding the total number of families, genera, and species, there was a large level of inconsistency among the major taxonomic categories. This was especially true when compared to the smaller groups. The families Poaceae (12), Cyperaceae and Asteraceae (10) and Fabaceae and Polygonaceae (6) were, in order, the most diverse in terms of the number of taxa that they encompassed. Poaceae had the most species, followed by Cyperaceae and Asteraceae.

There were a total of ten species in the Cyperaceae family, ten species in the Asteraceae family, and twelve species in the Poaceae family. There were three or more species in each of the genera Cyperus (7 species), Polygonum (4 species), Ranunculus (3 species), and Typha (3 sp.) [16]. Ranunculus contained the most species, with three, followed by Cyperus with seven. In the area that was being studied, helophytes made up 47.0% of the flora and were the most prevalent type of biological organism. The hemicryptophytes were found to be the second most prevalent form of life, taking up 15.7% of the total evaluation of life from the spectrum. The chorotype distributions of the many species that have a chance of being discovered in this wetland [17]. The research regions' floral diversity has been noticeably altered as a result of the pluriregional components' influence. According to the results of this inquiry, there are three separate habitats, which may be broken down as follows:

1. The environment in which marginal plants live: These environments were frequently found in damp areas that were situated next to wetlands, plains, rivers, and other such features. Plants such as Polygonum hydropiper and Polygonum lapathifolium, as well as Plantago major and Cyperus difformis, are examples of marginal plants [18].
2. These habitats, which included marshlands and other locations that were not accessible to the water, provided a home for the plants that emerge from the water [19]. Plants that were adapted to survive in this environment had an extraordinary ability for taking in large amounts of water.

   The first stage, which consists of the marginal habitat, is followed by the second stage, which consists of these different sorts of settings. Hydrocotyle vulgaris, Oenanthe aquatica, Sparganium erectum, Typha latifolia, Polygonum barbatum, and Nelumbium nuciferum were some of the species that were able to be found in this environment.
3. A habitat for plants that grow in open water It was determined that these parts of the habitat had both floating and submerged plants; yet, in general, this was determined to be a habitat that contained a small number of distinct species. The kelp Ceratophyllum demersum and the ranunculus trichophyllus are also good examples of species that have successfully adapted to these settings [20].

There is a correlation between the number of different plant species found in a given area and the presence of columns. A numerical representation of the total number of plant species that may be found in each ecosystem [21].

The variety of algae found in the wetland

The taxonomic categorization of the freshwater algae is dissected and investigated in this particular piece of writing. There are a total of 63 genera of fresh water algae, and these 63 genera have been separated into 8 different phyla based on their similarities and differences. The Cholorophyta family was the most prevalent, and within that family, there were a total of 28 unique genera [22].

This is the first phylum, and succeeding phyla include Bacillariophyta (19 genera), Cyanophyta (6 genera), Euglenophyta (4 species), Chrysophyta, Dinophyta (2 genera), Charophyta, Xanthophyta (2 genera), and Xanthophyta (2 genera) (each with one genus).

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Table 1. Species checklist of the algae that may be found in the jashpur wetland

Phylum	Genera
Bacillariophyta	*Achnanthes, Amphora, Caloneis, Cocconeis, Cyclotella Cymatopleura, Diploneis, Epithemia, Gomphonema Gyrosigma, Mastogloia, Melosira, Navicula, Nitzschia Pinnularia, Rhopalodia, Stephanodiscus, Surirella, Synedra*
Charophyta	*Chara*
Chlorophyta	*Ankistrodesmus, Asterococcus, Chlamydomonas, Chlorella, Codatella, Coelastrum, Cosmarium, Crusigenia, Dictyosphaerium, Golenkinia, Gonium, Kirchneriella, Lagerheimia, Micractinium, Monoraphidium, Mougeotia, Nephrocytium, Oedogonium, Oocystis, Pandorina Pediastrum, Selenastrum, Scenedesmus, Schroederia Staurastrum, Tetrastrum, Tetraedron, Westella*
Chrysophyta	*Dinobryon, Synura*
Cyanophyta	*Anabaena, Aphanizomenon, Chroococcus Merismopedia, Microcystis, Oscillatoria*
Dinophyta	*Peridinium, Ceratium*
Euglenophyta	*Euglena, Lepocinclis, Phacus, Trachelomonas*
Xanthophyta	*Ophiocytium*

When calculating the level of pollution in an area, the Palmer index takes into consideration the number of times specific species are seen during different times of the year. Across all four unique seasons, the pollution index was computed for each individual genus. [23] [24] the pollution index reached its highest point during the summer and fell to its lowest point during the winter.

Table 2. A table of the Palmer pollution index based on the flora of detected algae

Algal genera	Pollution Index	Spring	Summer	Autumn	Winter
Ankistrodesmus	2	2	2	2	-
Chlamydomonas	4	4	4	4	4
Chlorella	3	3	3	-	-
Cyclotella	1	1	1	1	-
Euglena	5	5	5	5	5
Gomphonema	1	1	-	-	1
Lepocinclis	1	1	1	1	-
Melosira	1	-	-	-	1
Micractinium	1	1	1	-	-

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Navicula	3	3	3	3	3
Nitzschia	3	3	3	3	3
Oscillatoria	5	5	5	5	5
Pandorina	-	-	-	-	1
Phacus	2	2	2	2	2
Scenedesmus	4	4	4	4	4
Synedra	2	-	2	2	-
Sum		35	36	32	29

Table 3. A comparison of the flora and fauna in terms of their richness and variety

	Present study	**Boujagh**	**Gomishan**	**Selkeh**	**Fereydoonkenar**	**Sorkhankol**
Total number of taxa (S)	102	248	116	102	248	81
Total number of genera (G)	80	164	72	84	176	68
Total number of families (F)	39	62	33	46	73	35
S/G	1.2	1.5	1.61	1.21	1.4	1.19
G/F	2.05	2.6	2.18	1.82	2.4	1.94

There were some similarities between the algal flora found in the study site and the algal flora found in other freshwater environments in Chhattisgarh (Masoudi et al. 2011; Ramezannejad Ghadi & Kianian Momeni 2012). The myriad of environmental conditions that influence the pace of growth and the geographic dispersion of these organisms are directly responsible for the variations in phytoplankton that take place during the course of the year. These situations can be divided into two distinct classes: abiotic and biotic (Thebault & Rabouille 2013). According to the Palmer Index, the wetland has a high ratio of pollution in every season. This high ratio of pollution may be produced by the seepage of pollutants such as nitrogen and phosphor from the agricultural fields that are placed in the surrounding region of the wetland. The surrounding region is where you'll find all of the agricultural fields (Palmer, 2020).

The presence of cyanobacteria in the wetland, such as Anabaena, Microcystis, and Aphanizomenon, is the primary cause that is accountable for the eutrophication symptoms that were found in the wetland (Mann 2020). As a consequence of this, there is a risk of toxic algal blooms as well as anoxic conditions, both of which have the potential to have a substantial influence on the birds that make use of this marsh as a food source and as a home (Gordon et al. 2011). According to the findings of a number of studies, the presence of algal colonies as a whole is a more reliable sign of contamination than the presence of single-celled algae (Patrick 1965; Palmer 1969; Taylor et al. 2004). As a result of this, the method that is the most up-to-date for measuring the amount of pollution favours the use of algal communities as indices over the use of a single algal indicator, as was the case in the current study [25] [26] [27]. Because it is a supply of water for agricultural fields and fish ponds, the wetland in Roshanabad

is particularly vital to the local population in terms of its economic worth [28, 29]. This is owing to the fact that it serves as a source of water for the community. In conclusion, it is vital to take preventative measures as soon as feasible and as quickly as possible against the entrance of sewage that comes from urban and agricultural sources into this wetland. These measures should be adopted as soon as possible..

DISCUSSION

It is generally agreed that the ecosystems found in the wetlands of Chhattisgarh are among the most fragile on the planet. The introduction of invasive aquatic weeds into these wetland areas is currently a major cause for concern, particularly in the south Caspian plain, where the climate creates favourable circumstances for the growth and spread of these plants[30]. This is a major cause for concern because the climate creates favourable circumstances for the growth and spread of these plants. One example of a tragedy that might have been averted is the propagation of water hyacinth, which is now recognised as a serious concern in many of the wetlands located in the province of Guilan[31] [32] [33]. Additionally, this should serve as a warning for other wetland regions that are for the most part undeveloped (Mozaffarian & Yaghoubi 2015).

The primary structural components of the wetland's vegetation were, on the whole, not dissimilar to the kind of plants that are native to Chhattisgarh (e.g. Naqinezhad et al., 2016; Naqinezhad & Hosseinzadeh, 2014) [34]. This was established by drawing parallels between the key structural components of the vegetation in the wetland and the sorts of plants that are found naturally in the state of Chhattisgarh. Nelumbium nuciferum is a species that can only be found in the world's oldest and most biologically diverse wetlands, such as the wetlands of Anzali, Amirkelayeh, and Fereydonkenar, amongst others [35]. Specifically, this species is only found in the wetlands of Anzali, Amirkelayeh, and Fereydonkenar. It is significant that this wetland contains a high concentration of Nelumbium nuciferum, which is a species that can only be found in the world's wetlands that are the oldest and most ecologically varied. This quality differentiates the wetland in question from others of similar types found elsewhere. The consequences of urbanisation and anthropogenic activity led to the researched wetland having fewer aquatic species than other wetlands did[36] [37] [38]. This was due to the fact that the analysed wetland was smaller than other wetlands. In spite of the fact that the ratios of species to genera and genera to families for the Roshanabad wetland were compared with those for other wetland locations, this was still the case. According to these ratios, lower taxa are of major value in terms of the diversity that they bring to the table in terms of the flora that was researched in the region.

This was determined via the investigation of the region's flora[39]. This is because there is a huge variety of different habitats for animals to live in. Because of the effect of agricultural and urban sewage, which contains large quantities of nitrate and phosphate, and the distribution of non-native aquatic plants such as Azolla filiculoides, this wetland has been unable to support the growth of a great number of species that are either submerged or floating. This is due to the fact that the wetland has been unable to support the growth of a great number of species that are either submerged or floating. This is the circumstance in other wetland locations where Azolla has an influence on the plants [40]. Because the stems and leaves of these plants are so resistant, it is quite difficult to break down the organic substance that they contain[41] [42]. [35] The buildup of sediments on the bottom of the marsh is caused in part by the cellulosic waste that is left over by their unproductive and very hard rhizome. There were discovered to be two species that were floating in the water, three species that were found to be submerged, and 22 species that were discovered to be emerging from the water [43] [44]. As a direct

consequence of this, the number of species that are able to successfully make the transition from the floating type to the emergent type is gradually increasing [45], [46]. This pattern of floristic composition is indicative of an intermediate seral stage in hydrosere, which is characterised by the continuous change of a body of water from a mesic habitat to a xeric environment and back again (Parveen et al. 2014) [47].

The therophytes were the most prevalent kind of life that was discovered in the region that was the subject of the investigation. However, the considerable prevalence of therophytes in arid locations may be attributed to human activities such as agricultural practises and the operations of fish ponds, in addition to the deterioration of ecosystems. Archbold (2019) discovered that arid areas had a significant number of therophytes [48].

In the past, this effect was discovered to have occurred in a number of other wetland ecosystems that were examined as well (Ghahreman et al. 2006; Ejtehadi et al. 2013; Khodadadi et al. 2019). In comparison to the other chorotypes, this region is characterised by a prevalence of pluriregional components. This is owing to the increased amount of aquatic and wetland plants that occur in these places, which assist to spread various forms of wetland and azonal habitat [49]. These plants help to spread different types of wetland and azonal habitat. The acts of humans, on the other hand, constitute an additional aspect that may be considered to be accountable for the widespread proliferation of weeds (Archibald 2016; Naqinezhad et al. 2016) [50].

CONCLUSION

In conclusion, the flora of various ponds in the city of jashpur in the state of Chhattisgarh is represented. Our mission is to do research on the topic, with a particular emphasis on the links that exist between natural resources and the health and happiness of humans. Because there are no rivers in the area, the paddy fields in the "Bowl of rice state" are irrigated by ponds instead of rivers. Paddy fields are an important part of the human food chain. A consciousness of the environment and its influence on traditional religious practises helps to promote a high-quality environment for human existence in this region.

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