



SPECIES DIVERSITY AND MACROPHYTES DISTRIBUTION IN BANSDAHA BEEL, EAST BURDWAN, WEST BENGAL, INDIA.

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Abstract: Essential and dynamic components of global ecosystems are wetland which provide an ample augmentation of ecosystem practices like water monitoring and biodiversity Khan et. al., (2022). Macrophytes diversity and distribution of Bansdaha Beel were explored in twenty different areas of the Beel. Total 60 macrophytic species were recognized which were under 30 families and 57 genera. Poaceae with 11 species, was the most varied family of macrophytic plants, followed by Araceae and cyperaceae with 5 species in each. In this study, macrophytic plants are classified on the basis of the Cooks' system. These are Vittate, Epihydantes, Hyperhydantes, Helophytes, Tenagophytes, Plankton, Pleustophytes, and Rosulate.

IndexTerms - Bansdaha Beel, Vittate, Helophytes, Tenagophytes

INTRODUCTION

Wetlands are generally considered as the traditional habitat between aquatic and terrestrial system that acts as the complex ecosystem of the world. The wetland remains wet but not throughout the years. Most of the wetlands are seasonally wet which link the land and water. Among the different of wetlands in the Burdwan District, Bansdaha Beel is one of the most resourceful and highly productive wetlands that provides services to human beings direct and indirectly. Nearly 6% of the uppermost area of the earth covered by wetlands Thorsell et. al., (1997). Wetlands are considered as kidney of the land and landscape because through water cycle, food chain and nutrient cycle its intake huge amount of enriched pollutants and filtrate these of pollutants. Generally, wetlands are found highly riched species variation and also habitat variation; therefore, wetlands are also called Super Market of Biology (Allen Diaz et. al., (2004). Wetland acts as water storage, provide water for human consumption, sediment retention and nutrients purification of water through certain plant species in the wetland ecosystem. Wetlands control various function like erosion, flood, ground water recharge and discharge, climatic condition by the plant species present in wetland water Gopal et. al., (1978), Dugan (1994), Ramsar convention Bureau, (1998). Plants observed in the Bansdaha Beel can be categorised into different groups.

Cook published a book for vascular plants named "Aquatic and Wetland Plants of India," which grow in seasonal fresh water in India Cook (1996). According to the Cook's classification system of aquatic plants, there are eight groups of life forms i.e., Vittate, Epihydantes, Hyperhydantes, Helophytes, Tenagophytes, Plankton, Pleustophytes, and Rosulate (Cook, 1996). This investigation contains different types of flora which are important for good environment for the Beel. No investigation has been accomplished in the Bansdaha Beel. The present investigation has been configured to explore the distribution and diversity of macrophytic plants in Bansdaha Beel which has been less studied area of West Bengal.

MATERIALS AND METHODS

Study Area

Bansdaha Beel is a wetland which is situated in western part of the river Bhagirathi basin. It lies between latitude 23.5781° N and longitude 88.1328° E. It is a wetland which is surrounded by the Champahati village, Kobla village in the East, Chakrahatpur in the West, Barokobla in the North and Nichu Champahati in the south. Bansdaha Beel is one of the fresh water wetlands of west Bengal. It is located at about 4.3 km away from East of Nabadwip Dham Railway Station. This wetland is located at about 16 metre of above mean sea level. The wetland represents a deep perennial water body and it is very old in age. The total surface area of the wetland during rainy season is approximately 7.64 sq. km while during the lean season the wet area become reduced to about 6.01 sq. km; the shore line of the wetland is 8 km, with the shoreline development 9.14 and the development of volume is 01.41. The shoreline development volume indicates the productive nature of the wetland. The wetland has an ox bow shaped flat basin with a tilt slope of from the margins. The texture of the sediments is found to be silty-loam. The wetland is eutrophic in

nature. A considerable portion of the wetland surface remain covered by a thick floating mat of aquatic flora. Field surveys and analyses were carried out over a span of year and monthly intervals in three different study sites.

Field Survey and Data Collection

In Bansdaha Beel, the systematic study was carried out to survey the wetland flora. Field visits were conducted to investigate the Beel to get macrophytic plants that cover the wetland habitat. The macrophytic specimens were collected by standard method from the Beel. The data collection included collection number and date, habitat, habitat occurrence and flowering season were carried out in monthly basis. Required information of macrophytic plants were documented in the trip notebook at the spot area. The plants of wetland collected in the field were pressed, dried out and preserved properly in accordance with the standard method as given by Krishnasamy *et. al.*, (2014). Voucher specimens of macrophytic plants were preserved in the herbarium on standard herbarium sheets of the Taxonomy Section, Department of Botany, Kalyani University, Kalyani, India.

WORKING PROCEDURE

macrophytic Flora Identification

Taxonomic identifications of the Flora of Bansdaha Beel were done throughout the period of investigation, plant specimens were collected and preserved at the Herbarium Section of the Department of Botany, Kalyani University, Kalyani, India. During the morphological evaluation, 3-6 specimen per species were investigated under a microscope (Kyowwa SZF, 0.74X–3.5X). The outcomes were compared with the Flora of West Bengal. (Beg, A., 1976), (Ali, S.I., and Qaiser, M., 1995), (Nasir, E., and Ali, S.I., 1971), and (Cook, et.al. 1974).

Classification of Wetland Plants

According to Cook system of Classification, on the basis of their growth forms, macrophytic plants are divided into seven categories (Cook, C.D.K. 1996) and (Khan. *et. al.*, 2022). These life forms are 1. Helophyte: The plants which can tolerate longer periods of submergence but not physiologically bound to remain in to water. 2. Hyperhydate: Plants in which stems and leaves brought out above the water surface where roots implanted in the substrate. 3. Plankton: Plants appeared in an area between the lower and bottom surface of the water, i.e., free swimming. 4. Pleustophyte: Plants that are not attached to the substrate free-floating on the surface water. 5. Rosulate: Having rosette leaves of these plants also rooted in the underlying substances or layer, 6. Tenagophyte: In young stage plants with submerged conditions and terrestrial in adult stage. 7. Submerged plants are those whose roots are in the substrate also in stems elongated leaves are arranged.

RESULTS AND DISCUSSIONS

Floristic Composition

Covering the macrophytic distribution of the wetlands in the investigation area, fifteen areas were selected for investigation. The present investigation exhibited that the study sites possess sixty species of wetland plants under 30 families and 57 genera. six life forms were documented in the investigated area influenced by swampy (23 species, 38.33%), followed by Emergent Anchored (16 species, 26.66%), Rooted Floating (10 species, 16.66%), Free Floating (7 species, 11.66%), Submerged Suspended (2 species, 3.33%) and Submerged Anchored (2 species, 3.33%). Even, lowest numbers i.e., 3 species of pteridophytes were recorded.

Poaceae with 11 taxa which were most prevail family of the Beel, followed by Araceae and Cyperaceae, with 5 species in each, Nymphaeaceae, Hydrocharitaceae and Asteraceae with 3 species in each followed by Apiaceae, Pontedariaceae, Convolvulaceae, Onagraceae, Polygonaceae with 2 species in each. Alismataceae, Azollaceae, Salviniaceae, Trapaceae, Menyanthaceae, Hydrocharitaceae, Ceratophyllaceae, Nelumbonaceae, Lentibulariaceae, Marsileaceae, Hydrophyllaceae, Amaranthaceae, Plantaginaceae, Portulacaceae, Euphorbiaceae, Acanthaceae, Commelinaceae, Cannaceae, Lamiaceae and Mimosaceae were monospecific recorded in the Bansdaha Beel.

Classification of macrophytic Plants

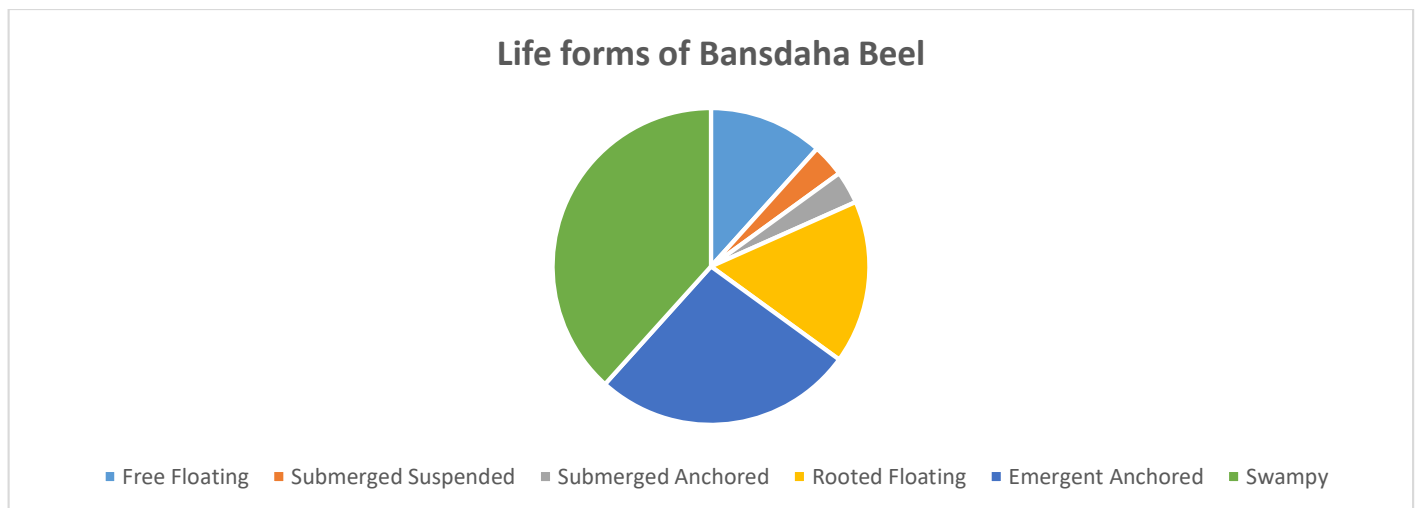
In this investigation, the macrophytic plants are classified based on Cook's classification system. The two-life form i.e., Rosulate and Epihydate were absent.

Table 1. Life forms of macrophytes of Bansdaha Beel.

Sl. No	Life forms	No. of species	Percentage of Life forms (%)
1	Free Floating Hydrophytes	7	11.66
2	Submerged Suspended Hydrophytes	2	3.33
3	Submerged Anchored Hydrophytes	2	3.33
4	Rooted Floating Hydrophytes	10	16.66
5	Emergent Anchored Hydrophytes	16	26.66
6	Swampy Hydrophytes	23	38.33
7	Total	60	

Table 2. Total number of taxa and percentage of life form of Bansdaha Beel.

Sl. No	Life forms	No. of Plants	Percentage of Plants (%)
1	Hyperhydate	12	36.36
2	Helophyte	3	9.09
3	Plankton	4	12.12
4	Pleustophyte	8	24.24
5	Tenagophyte	3	9.09
6	Vittate	1	3.03

Fig. 1. Graphical Percentage of Life form of the wetland Bansdaha Beel.**CONCLUSIONS:**

Bansdaha Beel is a very important resource of aquatic macrophytic plants. The exploration promulgated 60 aquatic macrophytic species belonging to 30 families and 57 genera. Poaceae, with 11 taxa was the most manifested family. followed by Araceae and Cyperaceae, with 5 species in each. The investigation accounted large number of macrophytic taxa i.e., Swampy type after that Emergent Anchored, Rooted Floating, Free floating, Submerged Suspended and Anchored. On the other hand, Cook's system of classification in which highest number of life forms observed i.e., Hyperhydate - 36.36% after that Pleustophyte, Plankton, Helophyte, Tenagophyte and Vittae respectively. The renowned Earth Summit Stockholm+50 held in 2002 in Sweden accentuated the necessity to protect the whole world biodiversity which connected with preservation as well as conservation of macrophytic plants on regional basis. In this investigated Beel it has been observed heterogeneous conglomeration of aquatic macrophyte.

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REFERENCES

1. Ali, S.I., & Qaiser, M. (1995). Flora of Pakistan; Department of Botany, University of Karachi: Karachi, Pakistan.
2. Ali, S.I., & Nasir, Y.J. (1989). Flora of Pakistan; Department of Botany, University of Karachi, Karachi and National Herbarium: Islamabad, Pakistan.
3. Allen-Diaz, B., Jackson, R., Bartolome, J., Tate, K., & Oates, L. (2004). Long-term grazing study in spring-fed wetlands reveals management tradeoffs. *California Agriculture*, 58(3), 144-148.
4. Beg, A., (1976). Flora of Peshawar District and Khyber Agency. —Pak. J. For. I Volume III, Part I. 26, 48–75.
5. Cook, C.D.K., Gut, B.J., Rix, E.M., & Schneller, J., (1974), *Water Plants of the World: A Manual for the Identification of the Genera of Freshwater Macrophytes*; Springer: Amsterdam, The Netherlands, ISBN 9061930243.
6. Cook, C. D. K. (1996). *Aquatic and wetland plants of India : a reference book and identification manual for the vascular found in permanent or seasonal fresh water in the subcontinent of India south of the Himalayas plants*. 385.
7. Dugan, P. J. (1994). *Wetlands in the 21st century: the challenge to conservation science*. *Global Wetlands, Old World and New Amsterdam*. Elsevier Science, 7(1), 75-88.
8. Gopal, B., Sharma, K. P., & Trivedy, R. K. (1978). Studies on ecology and production in Indian freshwater ecosystems at primary producer level with emphasis on macrophytes. *Glimpses of ecology*, 34(9), 349-376.
9. Khan, K., Shah, G. M., Saqib, Z., Rahman, I. U., Haq, S. M., Khan, M. A., Ali, N., Sakhi, S., Aziz-ud-din, Nawaz, G., Rahim, F., Rasheed, R. A., Al Farraj, D. A., & Elshikh, M. S. (2022). Species Diversity and Distribution of Macrophytes in Different Wetland Ecosystems. *Applied Sciences (Switzerland)*, 12(9), 4467. <https://doi.org/10.3390/APP12094467/S1>.
10. Khan, K., Shah, G.M., Saqib, Z., Rahman, I.U., Haq, S.M., Khan, M.A., Ali, N., Sakhi, S., Aziz-ud-Din, & Nawaz, G. (2022). Species Diversity and Distribution of Macrophytes in Different Wetland Ecosystems. *Appl. Sci.*, 12, 4467.
11. Krishnasamy, J., Rajendran, A., & Sarvalingam, A. (2014). Ornamental aquatic and semi-aquatic plants in Coimbatore district. "Biolife.", 2, 557–571.
12. Nasir, E., & Ali, S.I., (1971). *Flora West of Pakistan*; University of Karachi, Karachi and National Herbarium: Islamabad, Pakistan.
13. Ramsar Convention Bureau (1998). *Information sheet on Ramsar Wetlands*. Gland, Switzerland. pp 116.
14. Thorsell, Jim. "Protection of nature in mountain regions." (1997): 237-248.