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Floristic Diversity Studies on Valvaithankoshtam Pond, Kattathurai, Kanyakumari District, Tamil Nadu, India

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ABSTRACT

Floristic diversity of pond ecosystem depends upon the physico-chemical parameters of the water present in the ponds and other environment factors of the area. The present investigation concerns the survey of diversity of aquatic macrophytes and water quality of Valvaithankoshtampond, Kattathurai in Kanyakumari District of Tamil Nadu. The data was collected from the study area during the month of January to June, 2018. There were a total of 61 species recorded in which most are dicots. The pond is surrounded by coconut and rubber fields. There were 26 physico-chemical parameters in the pond which are carefully studied to find the quality of water in the pond. It was found that the pond has not lost much of its glory as the water quality studies gave out good results. The quality of is mainly responsible for the diversity of macrophytes in the pond. Therefore, the pond is not seen to be affected by the changing environments since it is far away from urban contact hence conservation actions are not needed to preserve the ecosystem. Even though, environmental awareness programs will be needed among the people living in the surrounding area which will help securing the pond's ecosystem in the future.

KEY WORDS: Water quality, aquatic ecosystem, floristic diversity, Kanyakumari, Macrophytes.

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INTRODUCTION

India has a wide variety of aquatic life due to its climatic, biotic and vast diversity. Water is one of the breath of life on earth, hence changes in the water ecosystem will considerably affect the aquatic community. Availability of water appears to be abundant, with ocean water constituting nearly 97percentages only 2.7 percentage of surface water is fresh. Previous studies of freshwater biodiversity showed the increasing anthropogenic impact¹ which leads to a huge loss of freshwater biodiversity². Certain macrophytes in the ponds are found useful to man and other lives. Since macrophytes are the major contributors of pond productivity³. The present investigations it been focused on the same. Richness of the species declines by the degradation of natural aquatic ecosystems that are inhibited by new man-made aquatic habitats such as canals, water reservoirs and fishponds⁴⁻⁵. The Kanyakumari district has good number of fresh water ponds and dams with wetlands and great variety of aquatic macrophytes. Wetlands are the source for rich diversity in class, composition and four broad categories of function viz. physical, chemical, biological and socioeconomic⁶. Wetland supports plant species that are common between aquatic and terrestrial habitats. Information on phytosociological data in any water body is very important to understand wetland ecosystem. Fresh water macrophytes have a vital role in ecosystems by supplying food and variety of habitats for large number of organisms including fishes⁷⁻⁸ has published many aquatic plants such as *Ipomoea aquatica*, *Nelumbo nucifera*, *Trapa bispinosa*, etc. are very useful to humans directly. In this study area no other research works has been carried out on water quality parameters till now.

MATERIALS AND METHODS

Study Area

In the present study, the water quality and floristic diversity of Valvaithankoshtam pond, Kattathurai in Kanyakumari district of Tamil Nadu was analysed. The total area of the pond is about 1.5 acre. This pond is located 2Km away from Kattathurai towards Valvaithankoshtam. The Kanyakumari district is blessed with abundant water resources like reservoirs, ponds and dams, housing a wide variety of aquatic macrophytes. The Petchiparai and Perunchani were the major resources of fresh water which collects water from the Western Ghats to feed water to different ponds and reservoirs through rivers and channels in Kanyakumari District⁹. The year is divided into four seasons, late November to end of February is the winter which is followed by pre-monsoon (March to May), June to September is the monsoon and from mid-September to first part of the November is the retreating monsoon. The climate of the district is characterized by cold foggy winter. The rainfall of this area ranges between 1500 mm to 2600mm with an average relative

humidity is about 75 %. Maximum temperature rises up to 38.5° C in the summer season while in the winter minimum temperature fall up to 7° C.

Collection of Data

The present work is based on the results of extensive systematic field surveys of the plants for a period January to June, 2018. Field trips were made once in a week covering entire water body with a view to find out the aquatic macrophytes. The plants were identified from fresh specimens with the help of different floras¹⁰. Macrophytes were collected by hand and was identified by experts of the field.

Water Analysis

Water samples were collected in sterile bottles with holding capacity of about 2 litres, which was then used for analysis. During the analysis, the physical, chemical and bacteriological composition studies were made.



Fig.1 - Study Area Valvaithankoshtam Pond, Kattathurai

RESULT AND DISCUSSION

Total number of aquatic macrophytes from Valvaithankoshtam pond, Kattathurai, Kanya kumari district was recorded. There were 61 species of 51 genera distributed in 30 families of aquatic plants, including pteridophytes, dicots and monocots of angiosperms. The most abundant aquatic macrophytes are *Eichorniacrassipes*, *Trapanatans*, *Pistiastratiotes*, *Hydrillaverticillata*, *Ipomoea aquatic* and *Salviniamolesta*.

The study area represented 67% of dicot, 10% of monocot and 23% of pteridophytic flora. The floral diversity observed in the study area with family and botanical name was displayed in Table.1 and Fig.2. The pond is filled with water throughout the year, adding to this it has floral richness. *Nymphaeais* one of the economically important plants that grow here, is used for packing purposes. Macrophytes are beneficial because they provide food for fishes and others. Some wetland

plants having nutritional values provide scope of utilizing as foods like *Amaranthusviridis* Hook.f., *Solanum torvum*Sw *Echinochloa colona* (L.) Link. *Nelumbo nucifera* Gaertrn, *Spirodela polyrhiza* L. and *Trapa natans* var¹¹. More than that the place is marked as goodwater storage area to provide sufficient water for agriculture and irrigation purposes and also used for ponds are frequently human-constructedincreases theground water level¹² has observed for 45 species in Thiruvallur district. Aquatic ecosystems are threatened globally due to their widespread resources which are utilized for human use. The main problems around the pond are overgrazing and human disturbance. The diversity of macrophytes has been intensively studied by various workers viz¹³⁻¹⁶.

Table 1 -Aquatic Diversity of Valvaithankoshtam Pond in Kanya kumari District of Tamil Nadu

S.No	Name of the species	Family	Vernacular Name	Habitat
Angiosperms				
1.	<i>Abutilon indicum</i> (Link)Sweet	Malvaceae	Thuthi	Shrub
2.	<i>Acalypha indica</i> L.	Euphorbiaceae	Kuppaimeni	Herb
3.	<i>Achyranthes aspera</i> L.	Amaranthaceae	Nayuruvi	Herb
4.	<i>Alternanthera sessilis</i> (L.)R.Br.ex Dc.	Amaranthaceae	Ponnanganni	Herb
5.	<i>Alysicarpus monilifer</i> (L) Dc.	Febaceae	Kasukkotai	Herb
6.	<i>Amaranthus spinosus</i> L.	Amaranthaceae	Mullukkeerai	Herb
7.	<i>Amaranthus viridis</i> L.	Amaranthaceae	Kuppaikirai	Herb
8.	<i>Barleria buxifolia</i> L.	Acanthaceae	Kattimullu	Shrub
9.	<i>Bergia capensis</i> L.	Elatinaceae	Nandu kollupu chedi	Shrub
10.	<i>Boerhavia diffusa</i> L.	Nyctaginaceae	Mukkurtaikkoti	Herb
11.	<i>Cardiospermum halicacabum</i> L.	Sapindaceae	Mudakathan keera	Climber
12.	<i>Ceratophyllum demersum</i> L.	Ceratophyl laceae	-----	Sub merged Floating plant
13.	<i>Chloris barbata</i> Sw.	Poaceae	-----	Herb
14.	<i>Cleome felina</i> L.	Cleomaceae	Cuvarnaciri Taivelai	Herb
15.	<i>Cleome viscosa</i> L.	Cleomaceae	Naikadugu	Herb
16.	<i>Clerodendrum infortunatum</i> L.	Verbenaceae	Perukilai	Shrub
17.	<i>Cocus nucifera</i> L.	Arecaceae	Thennai	Tree
18.	<i>Colocasia esculenta</i> (L.)Schoot.	Araceae	Elephant ear	
19.	<i>Corchorus trilocularis</i> L.	Tiliaceae	Wild jute	Herb
20.	<i>Cynodon dactylon</i> (L.)Pers.	Poacea	Arugampul	Herb
21.	<i>Cyperus defformis</i> L.	Cyperaceae	Vattakorai	Herb
22.	<i>Cyperus iria</i> L.	Cyperaceae	Yanaikki	Herb
23.	<i>Cyperus rotundus</i> L.	Cyperaceae	Muthakach	Herb
24.	<i>Eichhornia crassipes</i> (Mart.)solms.	Pontederiaceae	Venkayattamarai	Floating , clumpforming aquatic herb
25.	<i>Eleusine indica</i> (L.)Gaetn.	Poaceae	Goose grass	Herb
26.	<i>Euphorbia cyathophora</i> Murray.	Euphorbiaceae	Caturakakalli	Shrub
27.	<i>Euphorbia heterophylla</i> L.	Euphorbiaceae	Paal perukki	Herb
28.	<i>Gomphrena decumbens</i> Jacq.	Amaranthaceae	-----	Herb
29.	<i>Gossypium arboreum</i> L.	Malvaceae	Parutthi	Shrub
30.	<i>Heavea brasiliensis</i> Mull. Arg.	Euphorbiaceae	Rubber	Tree
31.	<i>Hibiscus rosasinensis</i> L.	Malvaceae	Ceparati	Shrub
32.	<i>Hydrilla verticillata</i> (Lf.)Royle.	Hydrocharitaceae	Amiranappaci	Aquatic Herb
33.	<i>Hyptis suaveolens</i> Poit.	Lamiaceae	Gangathulasi	Herb
34.	<i>Ipomoea aquatic</i> Forssk.	Convolvulaceae	Vallai	Aquatic plant
35.	<i>Justicia glauca</i> Rottl	Acanthaceae	Thavasi murungai	Shrub
36.	<i>Lantana camera</i> L.	Verbenaceae	Unnichi	Shrub
37.	<i>Leucas aspera</i> (Willd).Link	Lamiaceae	Thumbai	Herb.

38.	<i>Mimosa pudica</i> L.	Fabaceae	Touch me not	Under shrub
39.	<i>Nelumbo nucifera</i> Gaertn	Nelumbonaceae	Tamari	Aquatic plant
40.	<i>Ocimum tenuiflorum</i> L.	Lamiaceae	Thulasi	Shrub
41.	<i>Phyllanthus niruri</i> Linn.	Euphorbiaceae	Keezhanellai	Herb
42.	<i>Pistia stratiotes</i> L.	Araceae	-----	Free floating.
43.	<i>Ruellia tuberosa</i> L.	Acanthaceae	Pattaskai	Herb
44.	<i>Spermacoce tenuior</i> L.	Rubiaceae	-----	Herb
45.	<i>Sida acuta</i> Burm.f.	Malvaceae	Arivalmanipoнду	Shrub
46.	<i>Sida cordifolia</i> L.	Malvaceae	Vellakurunthottai	Shrub
47.	<i>Solanum nigrum</i> L.	Solanaceae	Manatakkali	Herb
48.	<i>Solanum torvum</i> Sw.	Solanaceae	Sundaikkai	Shrub
49.	<i>Synedrella nodiflora</i> (L.)Gaertn.	Asteraceae	Mudiyan pachchai	Herb
50.	<i>Tephrosia purpurea</i> (L.) Pers.	Fabaceae	Kollukkai velai	HERB
51.	<i>Trapa natans</i> L.	Trapaceae	Singheda	Floating plant
52.	<i>Tridax procubens</i> L.	Asteraceae	Coat Buttons	Herb
53.	<i>Vernonia cinerea</i> (L.)Less	Asteraceae	Neichati	Herb
54.	<i>Vitex negundo</i> L.	Verbenaceae	Nocchi	Shrub
Pteridophytes				
55.	<i>Adiantum caudatum</i> L.	Adiantaceae	-----	Herb
56.	<i>Adiantum latifolium</i> Lam.	Adiantaceae	-----	Fern, Herb
57.	<i>Ceratopteris thalictroides</i> (L.)Brongniart.	Pteridaceae	Water sprite	Water fern
58.	<i>Cyclosorus interruptus</i> (Willd) H.	Thelypteridaceae	Willdenow's maiden fern	Herb
59.	<i>Lycodium flexuosum</i> (L.)Sw.	Lycodiaceae	Climbing Fern	Climber
60.	<i>Marsilea quadrifolia</i> L.	Marsileaceae	-----	Aquatic fern
61.	<i>Salvinia auriculata</i> Aubl.	Salviniaceae	-----	Aquatic fern

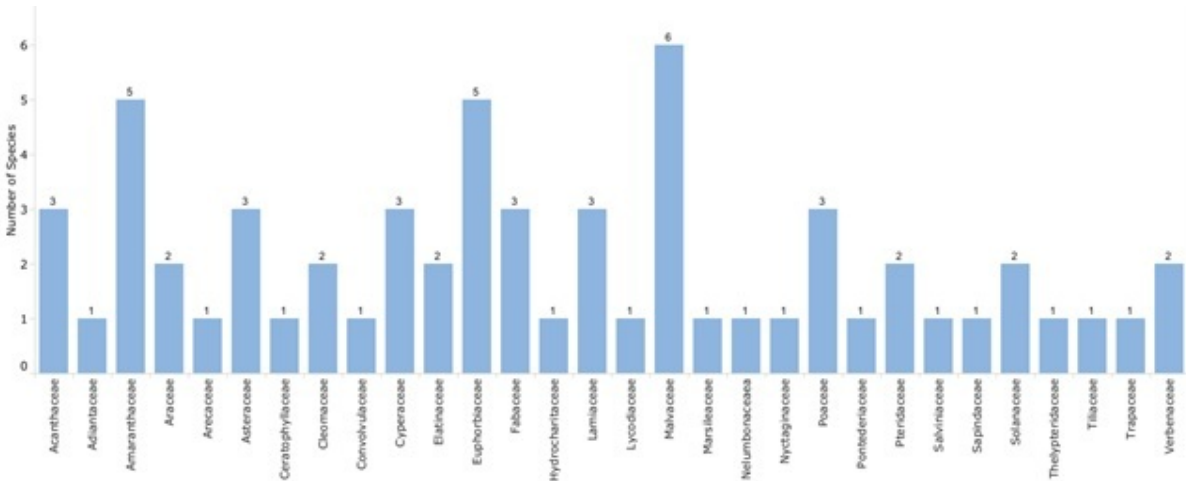


Fig. 2 -Floristic Diversity of Different Families Enumerated in ValvathankoshtamPond.

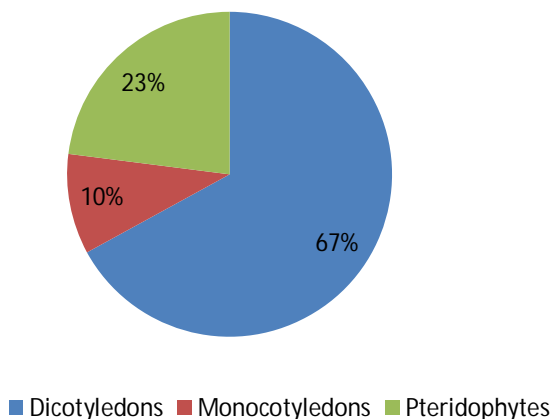


Fig.3 -Percentage of Different Groups of Plants in Valvaithankoshtam Pond.

The physico-chemical parameters like appearance, colour, odour, turbidity, total dissolved solids, electrical conductivity, pH, Alkalinity, Sodium, Iron, free Amino Acids and Nitrate content of the water collected from the pond was analysed. The results and the acceptable limits are present in Table 2. Water sample was turbid in nature and exhibits Colorlessness. The appearance is clear. Electrical conductivity of the selected water sample is 321 micro mho/cm. pH is found to be normal. Total alkalinity of the sample is comparatively less than the acceptable limit. Iron content of the water seems to be high comparing to the acceptable limit. Free amino acid as NH_3 mg/l present in the water is high in comparison with the acceptable limit (Table 2).

Table 2 - Physico-chemical examination of water of Valvaithankoshtam pond

S. No.	Parameters	Acceptable limit	Permissible limit in the absence of alternate source	Result
1.	Appearance	-	-	Clear
2.	Colour	5	15	Colourless
3.	Odour	Agreeable	Agreeable	None
4.	Turbidity NT Units	1	5	0
5.	Total dissolved Solids mg/L	500	2000	218
6.	Electrical Conductivity Micro mho/cm	-	-	321
7.	pH	6.5-8.5	6.5-8.5	6.90
8.	pH Alkalinity. As CaCO_3 mg/L	-	-	0
9.	Total Alkalinity. As CaCO_3 mg/L	200	600	60
10.	Total Hardness as CaCO_3 mg/L	200	600	112
11.	Calcium as Ca mg/L	75	200	19
12.	Magnesium as Mg mg/L	30	100	15
13.	Sodium as Na mg/L	-	-	23

14.	Potassium as K mg/L	-	-	5
15	Iron as Fe mg/L	0.3	1	0.35
16.	Manganese mg/L	0.1	0.3	0.00
17.	Free Ammonia as NH ₃ mg/L	0.5	0.5	1.28
18.	Nitrite as NO ₂ mg/L	-	-	0.10
19.	Nitrate as NO ₃ mg/L	45	45	2
20	Chloride as Cl mg/L	250	1000	70
21.	Fluoride as F mg/L	1.0	1.5	0
22.	Sulphate as SO ₄ mg/L	200	400	7
23	Phosphate as PO ₄ mg/L	-	-	0.26
24.	Tidies Test 4 hrs.as O ₂ mg/L	-	-	3.30

The pH of the selected pond ranged from 6.5-8.5 to 6.90 is good range for the survival of flora. Water can be perfectly clear, odourless and tasteless and yet unsafe for drinking¹⁷⁻¹⁹. Based on the WHO and SON guidelines, the pond water is not good for human health. In the way, the water used for washing and bathing should not contain more than 5 Fecal coli form bacteria per 100ml of water. Pathogenic organisms may or may not be present in water habitats. They are of public health significance having been associated with gastro intestinal infection diarrhea, dysentery, typhoid and other infection²⁰. Water Samples from the pond have total fecal *coli* form less than 5 per 100ml (**Table -3**). The dominance of emergent anchored among other growth forms indicates the encroachment of littoral vegetation, reducing the core area of the pond and showing the trend of succession towards marsh meadow condition.

Table 3 - Bacteriological examination of Valvaithankoshtam pond.

Parameters	Acceptable limit	Permissible limit in the absence of alternate source	Result
<i>Fecal coli form</i> per 100 ml.	100ml	100ml	5

CONCLUSION

The present report shows that a wide variety of valuable plants species are present in and around the Valvaithankoshtam pond. It seems that the area has not been much influenced by humans as the water analysis has significantly provided good results. The findings made in this study will help in the development of plantation techniques and appropriate species for plantation. The Valvaithankoshtam pond can be used for agricultural purposes, cattle washing, etc. Restoring traditional knowledge and by creating a passion for farming among the localities through agricultural

and environmental awareness programmers will be an effective strategy for the conservation of plant resources in the area.

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