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Floristic diversity of Arumanalloor wetland in Kanyakumari district of Tamil Nadu

Ani Besant S, A Anami Augustus Arul
Department of Botany, Holy Cross College, Affiliated to Manonmaniam Sundaranar University, Tirunelveli, Tamil Nadu, India

Abstract
The current research was carried out to investigate the wetland diversity of Arumanalloor in Kanyakumari district of Tamil Nadu. An extensive floristic survey with regular field visits was conducted during 2019 – 2020. During the field visits total of 103 species belong to 94 genera and 48 families have been reported. Out of these 103 species recorded, 13 species belong to pteridophytes, 64 species belong to dicotyledons, 26 species belong to monocotyledons were reported. Poaceae was the most dominant family with 11 plant species followed by Asteraceae, Euphorbiaceae and Pteridaceae. As a result, the regular floristic surveys are needed to examine and maintain the wetland diversity.

Keywords: wetland diversity, Floristic diversity, floristic survey

Introduction
Medinilla Gaudich. ex. DC, is an old Afro-asiatic genus consist of 430 species. Among these four species are Wetlands are important habitats because the heterogeneity in hydrology and soil conditions supports a broad variety of ecological niches and biodiversity (McCartney & Hera, 2004) [1]. Many wetlands harbour several kinds of economically useful macrophytes (Muthulingam *et al*., 2010) [2]. Ecosystem goods provided by the wetlands mainly include: water for irrigation, fisheries, non-timber forest products, water supply and recreation. Major services include carbon sequestration, flood control, ground water recharge, nutrient removal, toxic retention and biodiversity maintenance (Turner *et al*., 2000) [3]. A freshwater ecosystem can be defined by the plants in and around it. Always plants play a major role in the growth and decline of the aquatic regions.
Wetlands are playing a prominent ecological as well as economic role in aquatic ecosystems (Prasad *et al*., 2002) [4]. Worldwide there are more than 100 families of vascular aquatic plants about 7.5% of dicotyledonous and 11% of monocotyledonous (Raja *et al*., 2015) [5]. Aquatic plants grow profusely in lakes and waterways all over the worlds and have in recent decades their negative effects magnified by man's intensive use of natural water bodies (Ramulu & Benarjee, 2016) [6].
In Tamil Nadu, we have utilized more than 90% of the available surface water and more than 60% of the available ground water. Wetlands are "transitional area between a terrestrial and aquatic system where the water table is conventionally at or near the surface or land is covered by shallow water (Mitsch and Gosselink, 1986) [7]. The wetlands are lakes, ponds, reservoirs and seasonally water holding areas. Wetlands are major waterbodies seen around southern part of India. Especially the agriculture of Tamilnadu is only dependent of wetlands. Every year a part of budget is fixed to clear up a wetland. But nowadays the conditions of wetlands in Tamilnadu are hectic in condition. The water qualities of the wetlands were maintained by the phytoplankton and the macrophytes only.
Arumanalloor village is rich in wetlands; there are few rivers, streams, ponds in and around the village. This may be due to the presence of hilly regions and forest area. During rainy seasons the water from hilly regions were collected in the wetlands and used for irrigation purpose.
Different authors have reported diversity of aquatic macrophytes in various freshwater ecosystem all over the world (Ahmad *et al*., 2015; Kumar & Chelak, 2015; Ramulu & Benarjee, 2016; Gulia *et al*., 2017; Joshi, 2018) [9, 10, 6, 8, 11]. The present inventory deals with the documenting of aquatic flora of Arumanalloor wetland.

Study Area
Kanyakumari is a flourishing district positioned in southern India. It is bordered by Tirunelveli district and Kerala state. By nature, the district itself bound with number of wetlands around most of the area. Wetlands in the district are popular site for different variety of native and exotic plant wealth. The district is economically sound as it derives its income from agriculture set up. Topographically this district may be broadly classified as coastal region and interior plains region. The interior plain region surrounds hillocks, river and large number of wetlands such as seasonal and perennial ponds. It is a main resource of irrigation and drinking purposes. The wetlands screening the richness of hydrophytes it affords food and shelter for fishes, frogs, tortoise etc.
Arumanalloor village is a fertile region with a good number of water bodies like river, ponds, streams, etc. Arumanalloor wetland is also called as Periyakulam, because of the name itself it is the largest wetland of this

village. It is about 3.91 hectares area, used for irrigating nearby banana and paddy fields. Main source of water to this wetland is from nearby hillocks and the water inflow from Ananthanar Channel of Pechiparai and Perunchani dam. Periyakulam wetland and its environs were heavily infested with considerable percentage of aquatic macrophytes.

Materials and Methods

A systematic survey on the aquatic macrofloral diversity of the Arumanalloor wetland was carried out during 2019-2020, in which regular field visits were made at short intervals to collect the plants from the area. For identification, different types of macrophytes were handpicked from the wetland and sorted out in laboratory, the taxa were identified with the help of available literature, photographs and also confirmed by herbaria of Holy Cross College (Autonomous), Nagercoil. Author citation and binomial of collected species were verified with international plant names index (IPNI, 2009).

Results and Discussion

Throughout the path of survey total 103 species belongs to 94 genera and 48 families have been reported. Among the 48 families, 33 families belong to dicotyledons and 8 families belong to monocotyledon. A total of 7 families belongs to Pteridophytes were reported. Some families are quite dominant represented by many plant species and 27 families have representation of only one species.

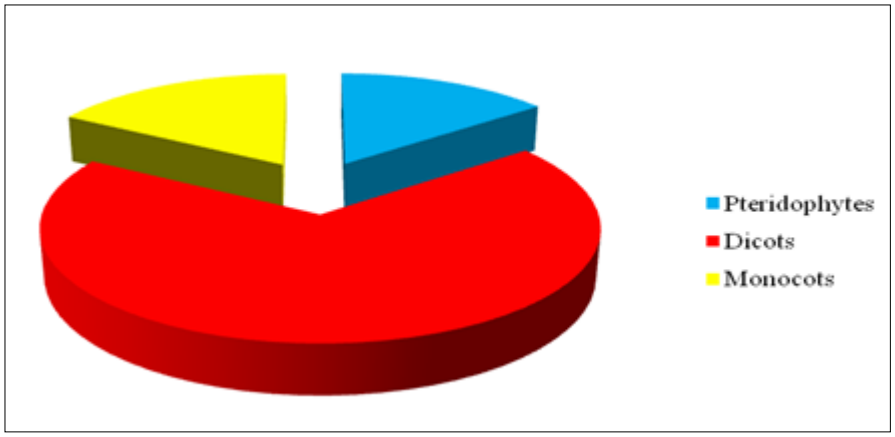

Fig 1: Distribution of aquatic plants in the study area

Poaceae was the most dominant family with 11 plant species followed by Asteraceae (7), Euphorbiaceae (6) and Pteridaceae (5). Previous findings of Lakshmanan & Gandhi (2018) [13], Raja *et al*. (2015) [5], Muthulingam *et al*. (2010) [2] has reported Poaceae as dominant family. Areaceae, Commelinaceae, Cyperaceae, Hydrocharitaceae, Pandanaceae, Poaceae, Pontederiaceae and Typhaceae were the monocot families recorded from the study area. Pteridophytes from 7 families were noticed during the field visit. The present study indicates that the study area was extremely prosperous in wetland plant biodiversity.

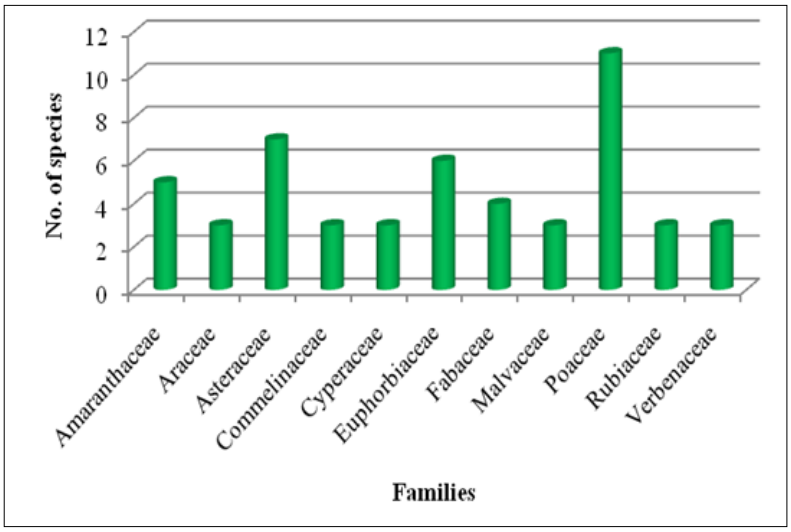

Fig 2: Dominant families recorded in the study area

Earlier Glenna and Raj (2019) reported 51 species of macrophytes from Valvaithankoshtam pond, Kattathurai in Kanyakumari district.

Most of the plants reported from the study was medicinally and economically essential. *Alternanthera sessilis*, *Amaranthus viridis*, *Eclipta alba*, *Centella asiatica* were few of the green leafy vegetable consumed by the nearby people of the study area. Most of the grasses dominant in the wetland was fed by cattle. The leaves of *Nymphea lotus* and *Colocasia esculenta* were used for packing flowers, fruits, fish and meat. The matured stem of *Cyperus pangorei* was collected for making mats.

Nymphaea is one of the economically important plant. Since the flowers have a spiritual importance and the leaves are used for flowers' packing (Ramarajan *et al*. (2015) [13].

Aquatic ecosystems are in danger of extinction worldwide due to their widespread resources which are utilized by human. The major troubles in the region of the wetland are mostly anthropogenic activities.

Table 1: Inventory of plants present in Arumanalloor wetland of Kanyakumari District

Sl. No	Plant Name	Family
Pteridophytes		
1.	*Adiantum caudatum L.*	Pteridaceae
2.	*Adiantum latifolium Lam.*	Pteridaceae
3.	*Adiantum philippense* L.	Pteridaceae
4.	*Azolla pinnata* R. Br.	Salviniaceae
5.	*Ceratopteris thallictroides* L.	Pteridaceae
6.	*Christella parasitica* (L.)H.LEV.	Thelypteridaceae
7.	*Lygodium flexuosum* (L.)Sw.	Lygodiaceae
8.	*Marsilea minuta* L.	Marsileaceae
9.	*Nephrodium* filix-mas (L.) Strempel	Dryopteridaceae
10.	*Nephrolepis multiflora* (Roxb.)Jarret	Nephrolepidaceae
11.	*Pityrogramma calomelanos* (L.)Link.var.*Calomelanos*	Pteridaceae
12.	*Pteris confusa* T.G.Walker	Pteridaceae
13.	*Salvinia natans* L.	Salviniaceae
Angiosperms		
14.	*Abutilon indicum* (Link)Sweet	Malvaceae
15.	*Acalypha indica* L.	Euphorbiaceae
16.	*Achyranthes aspera* L.	Amaranthaceae
17.	*Aerva lanata* (L.) Juss. ex Schult.	Amaranthaceae
18.	*Ageratum conyzoides* L.	Asteraceae
19.	*Alternanthera sessilis* (L.) R.Br. ex DC.	Amaranthaceae
20.	*Alysicarpus monilifer* (L) Dc.	Fabaceae
21.	*Amaranthus viridis* L.	Amaranthaceae
22.	*Apluda mutica* L.	Poaceae
23.	*Asystasia gangetica* (L.) T.	Acanthaceae
24.	*Boerhavia diffusa* L	Nyctaginaceae
25.	*Brachiaria distachya* (L.) Stapf.	Poaceae
26.	*Cardiospermum halicacabum* L.	Sapindaceae
27.	*Centella asiatica* (L.)Urban	Apiaceae
28.	*Ceratophyllum demersum* L.	Ceratophyllaceae
29.	*Chloris barbata* Sw.	Poaceae
30.	*Cleome gynandra* L.	Cleomaceae
31.	*Cleome viscosa* L.	Cleomaceae
32.	*Clerodendrum infortunatum* L.	Verbenaceae
33.	*Coccinia grandis* (L.)Voigh.	Cucurbitaceae
34.	*Colocasia esculenta* (L.)Schoot	Araceae
35.	*Commelina benghalensis* L.	Commelinaceae
36.	*Commelina clavata* C.B.Clarke	Commelinaceae
37.	*Crotolaria pallida* Dryd.	Fabaceae
38.	*Cyanotis cristata* (L.) D. Don.	Commelinaceae
39.	*Cynodon dactylon* (L.)Pers.	Poaceae
40.	*Cyperus articulatus* L.	Cyperaceae
41.	*Cyperus pangorei* Rottb.	Cyperaceae
42.	*Dactyloctenium aegyptium* (L.) Willd.	Poaceae
43.	*Desmodium heterophyllum* (Wild.)DC.	Fabaceae
44.	*Digitaria bicornis* (Lam.) Roem. & Schult.	Poaceae
45.	*Eclipta alba* (L.) Hassk.	Asteraceae
46.	*Eichhornia crassipes* (Mart.)solms	Pontederiaceae
47.	*Eleusine indica* (L.)Gaertn	Poaceae

48.	*Eragrostis tenella* (L.) Beauv.	Poaceae
49.	*Eriochloa procera* (Retz.) CEHubb.	Poaceae
50.	*Euphorbia cyathophora* Murray.	Euphorbiaceae
51.	*Gomphrena decumbens* Jacq.	Amaranthaceae
52.	*Hydrilla verticillata* (Lf.)Royle	Hydrocharitaceae
53.	*Hyptis suaveolens* Poit.	Lamiaceae
54.	*Ipomoea aquatica* Forssk.	Convolvulaceae
55.	*Ipomoea carnea* Jacq.	Convolvulaceae
56.	*Jatropha glandulifera* Roxb.	Euphorbiaceae
57.	*Jussiea repens* L.	Onagraceae
58.	*Kylinga bulbosa* Beavu.	Cyperaceae
59.	*Lantana camera* L.	Verbenaceae
60.	*Lemna minor* L.	Araceae
61.	*Leucas aspera* (Willd).Link	Lamiaceae
62.	*Limnophila heterophylla* (Roxb.)Benth.	Plantaginaceae
63.	*Lindernia antipoda* (L.) Alston	Linderniaceae
64.	*Ludwigia perennis* L.	Onagraceae
65.	*Mimosa pudica* L.	Mimosaceae
66.	*Mollugo pentaphylla* L.	Molluginaceae
67.	*Monocharia vaginalis* (Burm.f) Presl.	Pontederiaceae
68.	*Mukia maderaspatana* (L.)M.Roem	Cucurbitaceae
69.	*Nelumbium speciosum* Willd	Nelumbonaceae
70.	*Nelumbo nucifera* Gaertn.	Nelumbonaceae
71.	*Nymphea lotus* L.	Nymphaeaceae
72.	*Nymphoides cristata* (Lour)	Menyanthaceae
73.	*Oldenlandia corymbosa* L.	Rubiaceae
74.	*Oryza perennis* Moench	Poaceae
75.	*Pandanus odoratissimus* L.f.	Pandanaceae
76.	*Passiflora foetida* L.	Passifloraceae
77.	*Phyllanthus amarus* Schum & Thonn.	Euphorbiaceae
78.	*Phyllanthus maderaspatensis* L.	Euphorbiaceae
79.	*Phyllanthus niruri* Linn.	Euphorbiaceae
80.	*Pistia stratiotes* L.	Araceae
81.	*Polygonum glabrum* Willd.	Polygonaceae
82.	*Portulaca oleracea* L.	Portulacaceae
83.	*Ruellia tuberosa* L.	Acanthaceae
84.	*Saccharum spontaneum* L.	Poaceae
85.	*Scoparia dulcis* L.	Scorphulariaceae
86.	*Sennna tora* (L.) Roxb.	Caesalpiniaceae
87.	*Sida acuta* Burm.f.	Malvaceae
88.	*Sida cordifolia* L.	Malvaceae
89.	*Solanum nigrum* L.	Solanaceae
90.	*Spermacoce hispida* L.	Rubiaceae
91.	*Spermacoce cymoides* L.	Rubiaceae
92.	*Sphagneticola trilobata* (L.)prsk	Asteraceae
93.	*Stachytarpheta jamaicensis* (L.) Vahl.	Verbenaceae
94.	*Syndrella nodiflora* (L)Gaertn	Asteraceae
95.	*Tephrosia purpurea* (L.) Pers.	Fabaceae
96.	*Trapa natans* L.	Trapaceae
97.	*Trianthema portulacastrum* L.	Aizoaceae
98.	*Tridax procumbens* L.	Asteraceae
99.	*Typha angustifolia* L.	Typhaceae
100.	*Urticularia stellaris* L.f.	Lentibulariaceae
101.	*Vallisneria spiralis* L.	Hydrocharitaceae
102.	*Vernonia cinerea* (L.)Less	Asteraceae
103.	*Xanthium indicum* Koenig	Asteraceae

Conclusion

Wetlands are considered to have distinctive ecological features which provide numerous products and services to humanity. Sustainable development and conservation are essential for the survival of the freshwater ecosystems. The ecosystem seen in wetland provides food and shelter for numerous living beings. So, the richness of

biodiversity should be maintained in a good way. A special character of the wetland was, it maintains high level of ground water. The water holding capacity of the wetland was not properly maintained nowadays. So, it severely affects the flora of the study area also. It is necessary to protect such ecosystems for the betterment of humankind.

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