



A report on macrophytes of Nakki Lake, Mount Abu, (Rajasthan), India

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Abstract

A beautiful water body giving scenic essence, ecological balance and mythological historical background situated in the colorful state of Rajasthan is Nakki Lake, Mount Abu studied for the present work. The present study was conducted to evaluate macrophytes population in and around the lake. The present research is first time reported from study area. The macrophytes of Nakki Lake revealed the presence of 70 species of 58 genera belonging to 34 angiospermic families. The diverse macrophyte habitat forms reported from study site indicates that, the Nakki lake is very abundant in plant biodiversity particularly the marginal species. The checklist generated of macrophyte in the study is proposed to support baseline source for researchers leading further research.

Keywords: macrophyte, Nakki lake, Mount Abu

Introduction

Macrophytes are the plants which are noticed by the naked eye and always recognizable when observed. (Home and Whitton, 1977) ^[1] Studies on macrophytes (aquatic and non-aquatic) nationally and internationally are well documented by Arber (1920); Chavan and Sabnis (1961); Maheshwari (1960); Subrahmanyam (1962); Unni (1967); Bursche (1971); Bhaskar and Razi (1973); Babu (1977); Zutshi *et al.* (1980) Lavania *et al.* (1990) and Cook (1996) ^[2-12].

Macrophytes as component of lake eco-system, play a great role in supporting the types of food chains in the aquatic body, (Reshi *et al.*, 2021) ^[13] in determining pollution, nutrient content, water quality and lake trophic position. (Arya *et al.*, 2018) ^[14]. Aquatic organism communities can help in indices towards pollution and it is commonly accepted and stated by Wu, (1984) ^[15] in his study on phytoplankton as bioindicator for water quality in Taipei.

Material and Method

The study of macrophytes of lake Nakki was carried out by field visits at seasonal interval. Total area of 3 km i.e. round-off periphery of lake Nakki was taken under the present study. Plant photographs were taken with standard digital camera. Further, the recorded macrophytes are enumerated alphabetically providing scientific name with their families, habit and habitat.

The surveyed macrophyte plants were identified using different books, floras, research paper including Biswas and Calder (1936); Babu (1977); Subramanyam (1962); Deb (1981,1983) and Das (2013) ^[16-21]. For correct nomenclature of identified plant, the online database of plants was used, websites name "Plant List", which is creation of teamwork of "Royal Botanic Gardens, Kew and Missouri Botanical Gardens" these provide multiple checklist of plants with the most accepted Latin name for plant species with related to

species synonyms also ^[22]. The review given by Kalwij *et al.* for the plant list stated that "the straightforward web design and search results provides a valuable resource of plant nomenclature". (Kalwij *et al.* 2012) ^[23]

Study Area

Nakki lake is situated at height lake found in the hill station of Rajasthan, 'Mount Abu'. The lake embraces an immense mythological significance owing to its origin which supports the blessedness of the lake. The lake Nakki is mainly surrounded by mountains and found situated in the center of the city. The lake is 12.25 meter deep, having rocky bottom side and round off margin or periphery of about 3km. Nakki lake has water capacity of about 270 million gallons approximately. Nakki Lake holds a great role for local dwellers as it is the single resource of drinking water in warmer months to the people and provide economic support through tourism. Nakki lake is the only large water body in Mount Abu therefore it occupies the most significant value for these studies.

Results

In the present study, an investigation of macrophytes of the lake Nakki was carried out in 2019. During these surveys an overall of 70 species of macrophytes were observed from the lake Nakki. The macrophyte diversity of lake all together is found to be composed of 34 families and 58 Genera. Out of these total 34 plant families, the Fabaceae family was found to be highly leading in the reported macrophytes families of lake Nakki. This reveals that lake has acquired a rich form of biodiversity.

The recorded list of macrophyte plants with families has been enumerated in Table 1. This is the first report on plant diversity which is presented in our study from Nakki lake (Mount Abu, Rajasthan).

Table 1: Macrophytes of Nakki Lake (2019).

Sr. No.	Botanical Name	Habit	Habitat	Family
1.	<i>Argyrea nervosa</i> (Burm. f.) Bojer	Herb	Marginal	Convolvulaceae
2.	<i>Anogeissus sericea</i> Brandis	Tree	Marginal	Combretaceae
3.	<i>Albizia odorettisima</i> (L.f.) Benth.	Tree	Marginal	Fabaceae
4.	<i>Argemone Mexicana</i> L.	Herb	Marginal	Papaveraceae
5.	<i>Bambusa vulgaris</i> Schrad.	Tree like grass	Marginal	Poaceae
6.	<i>Brassica campestris</i> L.	Herb	Marginal	Brassicaceae
7.	<i>Butea monosperma</i> (Lam.) Taub.	Tree	Marginal	Fabaceae
8.	<i>Bauhinia variegata</i> L.	Tree	Marginal	Fabaceae
9.	<i>Buddleja madagascariensis</i> Lam.	Shrub	Marginal	Scrophulariaceae
10.	<i>Bougainvillea glabra</i> Choisy	Shrub	Marginal	Nyctaginaceae
11.	<i>Corallocarpus epigaeus</i> (Rotler) Hook. F.	Herb	Marginal	Cucurbitaceae
12.	<i>Cayratia trifolia</i> (L.) Domin	Shrub	Marginal	Vitaceae
13.	<i>Cassia fistula</i> L.	Tree	Marginal	Fabaceae
14.	<i>Cassia pumila</i> L.	Herb	Marginal	Fabaceae
15.	<i>Conyza bonariensis</i> (L.) Cronquist	Herb	Marginal	Asteraceae
16.	<i>Cyperus</i> sp. L.	Herb	Emergent	Cyperaceae
17.	<i>Capparis sepiaria</i> L.	Shrub	Marginal	Capparaceae
18.	<i>Cenchrus setigerus</i> Vahl	Grassy Herb	Marginal	Poaceae
19.	<i>Chenopodium</i> sp. L.	Herb	Marginal	Amaranthaceae
20.	<i>Chenopodium murel</i> L.	Herb	Marginal	Amaranthaceae
21.	<i>Callistemon lanceolatus</i> (Sm.) Sweet	Tree	Marginal	Myrtaceae
22.	<i>Carissa carandas</i> L.	Shrub	Marginal	Apocynaceae
23.	<i>Cynodon dactylon</i> (L.) Pers.	Herb	Marginal	Poaceae
24.	<i>Dyerophytum indicum</i> (Gibbs ex wight) Kuntze	Under shrub	Marginal	Plumbaginaceae
25.	<i>Datura innoxia</i> Mill.	Herb	Marginal	Solanaceae
26.	<i>Erythrina stricta</i> Roxb.	Tree	Marginal	Fabaceae
27.	<i>Euphorbia parviflora</i> L.	Herb	Marginal	Euphorbiaceae
28.	<i>Euphorbia hirta</i> L.	Herb	Marginal	Euphorbiaceae
29.	<i>Ficus</i> sp.	Tree	Marginal	Moraceae
30.	<i>Ficus arnottiana</i> (Miq.) Miq.	Tree	Marginal	Moraceae
31.	<i>Ficus elastica</i> Roxb. ex Hornem.	Tree	Marginal	Moraceae
32.	<i>Ficus carica</i> L.	Tree	Marginal	Moraceae
33.	<i>Furcraea foetida</i> (L.) Haw.	Shrub	Marginal	Asparagaceae
34.	<i>Grevillea robusta</i> A. cunn. Ex R. Br.	Tree	Marginal	Proteaceae
35.	<i>Hibiscus rosa-sinensis</i> L.	Herb or Shrub	Marginal	Malvaceae
36.	<i>Hamiltonia suaveolens</i> (Roxb.) Roxb.	Shrub	Marginal	Rubiaceae
37.	<i>Ipomoea</i> sp.	Herb	Emergent	Convolvulaceae
38.	<i>Ipomea cairica</i> (L.) Sweet	Climber Herb	Marginal	Convolvulaceae
39.	<i>Kirganelia reticulata</i> (Poir) Baill	Shrub	Marginal	Euphorbiaceae
40.	<i>Kydia calycina</i> Roxb.	Tree	Marginal	Malvaceae
41.	<i>Lanea coromandelica</i> (Houtt) Merr.	Tree	Marginal	Anacardiaceae
42.	<i>Lindenbergia muraria</i> (Roxburgh ex D. Don) Bruh	Herb	Marginal	Orobanchaceae
43.	<i>Lantana camara</i> L.	Shrub	Marginal	Verbanaceae
44.	<i>Mirabilis jalapa</i> L.	Herb	Marginal	Nyctaginaceae
45.	<i>Mangifera indica</i> L.	Tree	Marginal	Anacardiaceae
46.	<i>Mallotus philippensis</i> (Lam.) Mull. Arg.	Tree	Marginal	Euphorbiaceae
47.	<i>Morus alba</i> L.	Tree	Marginal	Moraceae
48.	<i>Nerium indicum</i> Mill	Shrub	Marginal	Apocynaceae
49.	<i>Nicotiana plumbaginifolia</i> Viv.	Herb	Marginal	Solanaceae
50.	<i>Nicandra physalodes</i> (L.) Gaertn.	Herb	Marginal	Solanaceae
51.	<i>Oxalis corniculata</i> L.	Herb	Marginal	Oxalidaceae
52.	<i>Phoenix sylvestris</i> (L.) Roxb.	Tree	Marginal	Arecaceae
53.	<i>Pithecellobium dulce</i> (Roxb.) Benth.	Tree	Marginal	Fabaceae
54.	<i>Parthenium hysterophorus</i> L.	Herb	Marginal	Asteraceae
55.	<i>Pennisetum americanum</i> (L.) Leeke	Herb	Emergent	Poaceae
56.	<i>Polygonum glabrum</i> Wild.	Herb	Emergent	Polygonaceae
57.	<i>Ricinus communis</i> L.	Shrub	Marginal	Euphorbiaceae
58.	<i>Salix tetrasperma</i> Roxb.	Tree	Emergent	Salicaceae
59.	<i>Solanum nigrum</i> L.	Shrub	Marginal	Solanaceae
60.	<i>Sonchus asper</i> (L.) Hill	Herb	Marginal	Asteraceae
61.	<i>Sauromatum pedatum</i> (Link & Otto) Schott	Herb	Marginal	Araceae
62.	<i>Syzygium cumini</i> (L.) Skeels	Tree	Marginal	Myrtaceae
63.	<i>Trema orientalis</i> (L.) Blume.	Tree	Marginal	Cannabaceae
64.	<i>Trema politoria</i> (Planch.) Blume	Tree	Marginal	Cannabaceae
65.	<i>Thevetia peruviana</i> (Pers.) K. Schum.	Shrub	Marginal	Apocynaceae

66.	<i>Triumfetta pentandra</i> A. Rich.	Herb	Marginal	Malvaceae
67.	<i>Tridax procumbens</i> L.	Herb	Marginal	Asteraceae
68.	<i>Tagetes</i> L.	Herb	Marginal	Asteraceae
69.	<i>Verbascum Chinense</i> (L.) Santapav	Herb	Marginal	Scrophulariaceae
70.	<i>Xanthium strumarium</i> L.	Under shrub	Marginal	Asteraceae

Discussion

The macrophyte composition was founded with total of 70 species of macrophyte in and around lake Nakki (2019). In the present study the recorded macrophytes were classified on the basis of macrophyte habitat were Submerged, marginal, emergent and floating. (Keddy,2000) [24]. Following these habitat categories, the macrophytes in Nakki lake was found mostly marginal followed by fewer emergent while the absence of submerged and floating type of habitat was observed. This reveals the lack of aquatic plants in lake Nakki. Hence, the abundantly presence of marginal macrophytes in lake Nakki plays a most significant role in protecting and nourishing every component of the lake ecosystem.

Thus, from the study of macrophyte habitat it is concluded that during the study period the recorded marginal macrophytes species were more in lake Nakki while emergent type of macrophyte habitat was present very less whereas aquatic macrophyte habitat form of especially submerged and floating was found totally absent.

In the present observation, the total macrophyte vegetation in lake Nakki (2019) was reported with fewer number of aquatic macrophytes with large number of terrestrial macrophytes. These present finding is in strong agreement to Singh who has noticed the replacement of typical submerged and rooted macrophyte to phytoplankton (algal) bloom in lake Nakki due to increased domestic influx into the lake. (Singh 1953) [25]. According to Engelhardt and Ritchie [26] loss in macrophyte sp. decrease the functions of lake ecosystem.

In the present observation, similar trend of lack of aquatic macrophytes (especially submerged, free floating and rooted plant) was noticed in Nakki lake. According to Robach *et al.* (1996) [27] & Dawson *et al.* (1999) [28] "submerged species are strongly dependent on water quality and these are proved to be vulnerable to change in the aquatic environment". Another factor which is responsible for reduction in aquatic macrophyte is light transmission and water turbidity. Both these factors are inversely proportional to each other.

The present study was mostly noticed with the turbid phytoplankton state in lake Nakki. The move of macrophyte toward phytoplankton status in the shallow types of lake was mainly due to the nutrient enrichment load in lake, which is similar as noticed by Noriko *et al.* (2003) [29] in three shallow lakes. Similar loss of aquatic flora and in species miscellany have been noticed in many lakes of Japan and mentioned that this was due to eutrophication, embankment near littoral extents and increased water level which causes decline in light availability. (Sakurai, 1981; Ohksuke *et al.* 1996) [30-31]. Thus, the major factor responsible for lacking in macrophytes in Nakki lake was mainly due to decrease in light transmission because the presence of algal layer in lake, was observed always during the entire study period and which might be the cause of the lessening in aquatic growth of plants.

Conclusion

The diverse macrophyte habitat forms reported from study site indicates that, the Nakki lake is very abundant in plant biodiversity particularly the marginal species. However, Loss of submerged and floating forms of aquatic macrophyte was noticed, which might be the result of nutrients level enrichment. The checklist generated of macrophyte in the study is proposed to support baseline source for researchers leading further research.

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