

BIODIVERSITY ASSESSMENT OF AQUATIC PLANTS IN SRI GANGANAGAR DISTRICT OF RAJASTHAN, INDIA

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ABSTRACT

In most of fresh water system aquatic plants are important components of food web dynamics. The aquatic plants not only play a crucial role to maintain the composition of aquatic ecosystem but also, they have vital role in human welfare. In the present study an account is given of aquatic plants conducted in some fresh water bodies at Sri Ganganagar district of Rajasthan, India. A field survey of the study area was carried out to describes the aquatic diversity on the basis of their morphological characteristics. During the study total 15 aquatic angiosperm plant species were identified which belongs to 11 families. Data inventory consists of botanical name, family name, local name, habitats and their description.

Keywords: Biodiversity, Aquatic Ecosystem, Conservation, Awareness

INTRODUCTION

Human health and well-being are directly dependent on biodiversity. Terrestrial as well as aquatic biodiversity constitute a valuable natural resource in economic, cultural, aesthetic, scientific and educational terms. Biodiversity includes assemblage of plants, animals and micro-organisms, their genetic variability expressed in varieties and populations, their habitats, ecosystems and natural areas, the mosaic of which gives richness to the natural environment. Biodiversity or biological resources provide food, clothing, housing, medicine and spiritual nourishment to human beings (Kulshrestha, 2005). The majority of aquatic plants are consumed only after they have died and partially decomposed into detritus. Detritus is eaten primarily by aquatic insects, invertebrates and larger crustacean (Madsen, 2009). The potential of aquatic plants as food and feed has been emphasized by several authors (Bhowmik *et al.*, 2013). They are major components of fresh water ecosystems in that they play key functions, contribute to maintain the related biodiversity and supply services to human society. Aquatic plants can form the non-conventional sources of foods, medicines for many diseases. Indeed, they are primary producers that provide habitat, food and refuges for periphyton, invertebrates, fish,

amphibians and birds. They also participate to ensuring the clear state of shallow waterbodies through their effect on biogeochemical cycles and on the sediment deposition process (Bornette and Pujalon, 2011). Aquatic habitats are also crucial in providing necessary habitat for feeding, nesting and migrating waterfowl (Havera, 1999).

Fresh water ecosystems are experiencing decline in biodiversity far greater than those in the most affected terrestrial ecosystems. Threats to fresh waters such as pollution of different kinds, unfavorable climatic changes, eutrophication, acidification, and alien species invasion lead to reduction in native hydrophytes diversity (Chambers *et al.*, 2008). Conservation of freshwater biodiversity faces serious challenges because of lack of public awareness about its magnitude and importance (Dudgeon, 2000). Most of the people are more conscious about the conservation of forests but aquatic plants are more or less neglected. Aquatic biodiversity, which is poorly understood in comparison to terrestrial biodiversity and at the same time faces several threatened by invasive species, climatic change, habitat degradation and change in ecosystem conditions. Keeping these facts in mind, the present work is to give importance to aquatic plants and to their conservation.

MATERIALS AND METHODS

Northern Semi-Arid region of Rajasthan comprises of Ganganagar, Hanumangarh, part of Churu and a part of Bikaner, Jodhpur and Barmer Districts. As the canal irrigation starts from northern most Ganganagar district so it is the most affected part of Semi-Arid region. It constitutes a part of the Great Indian Desert and is under intensive cultivation and irrigation by a network of canals. The Great Indian desert, also form a large part of Thar Desert, has its own importance and specific characteristics with respect to endemic and medicinal plants. The district of Ganganagar having an area of 20,629 sq. kms. is situated in the northern part of Rajasthan State between 28040'-30006' N latitudes and 72036'-75030' longitudes. It constitutes a part of the Great Indian Desert. The district is being irrigated by the Gang Canal, Bhakra Canal and Indira Gandhi Canal which has greatly affected the natural flora of the area in many ways which we call repercussion of canal irrigation.

CLIMATIC CONDITION OF STUDY AREA

The District Ganganagar is a part of the Thar Desert and its unirrigated part is covered by thick layer of alluvium and windblown sand. Generally sand dunes are 4 to 5 m in height. Regional elevation of ground

ranges from 100 to 300 meters above mean sea level. The climate of the study area is semi-arid to arid except southwest monsoon season during the period July to mid of September, which is followed by post monsoon period till the end of November. The winter season is from December to February and is followed by summer from March to June. Climatic condition for vegetation is inhospitable in summers temperature goes up to 49°C and winter remains cool some time falls below freezing point. Daily and annual temperature fluctuation is common feature of the area. Rainfall is of unreliable nature. In general, the vegetation in this arid and semi-arid region is sparse. Plants with only xerophytic adaptation are able to survive without irrigation facilities. The bulk of vegetation consists of stunted, thorny or prickly trees, shrubs and perennial herbs capable to drought resistance. In the semi-arid region, the vegetation mainly consists of dwarf grasses interspersed with few characteristics desert shrubs. The average annual rainfall is 300 mm (June to September) with maximum rainfall in July–August.

RESULTS

The present study focuses on an inventory of aquatic angiosperm diversity of Sri Ganganagar district of Rajasthan. Selection of the ponds for the collection of plants has been done as per the richness of ponds. After carefully screenings following aquatic angiosperm plants have been recognized. For each species botanical name, local name, family name, descriptions were provided. The present study recorded 15 species of aquatic plants belonging to 11 family in study area. Families with maximum number of species includes Araceae with four species followed by Hydrocharitaceae (two). Ceratophyllaceae, Convolvulaceae, Nelumbonaceae, Nymphaeaceae, Pontederiaceae, Polygonaceae, Potamogetonaceae, Trapaceae and Typhaceae were represented by only one species (Table 1).

Among five morpho-ecological groups, free floating with 40% dominated in the study areas followed by anchored submerged (20%), anchored floating (20%), emergent amphibious (13%) and free submerged with only 6.66% (Fig 1).

Figure 1: Analysis of data based on habitats showed by the Aquatic Plants

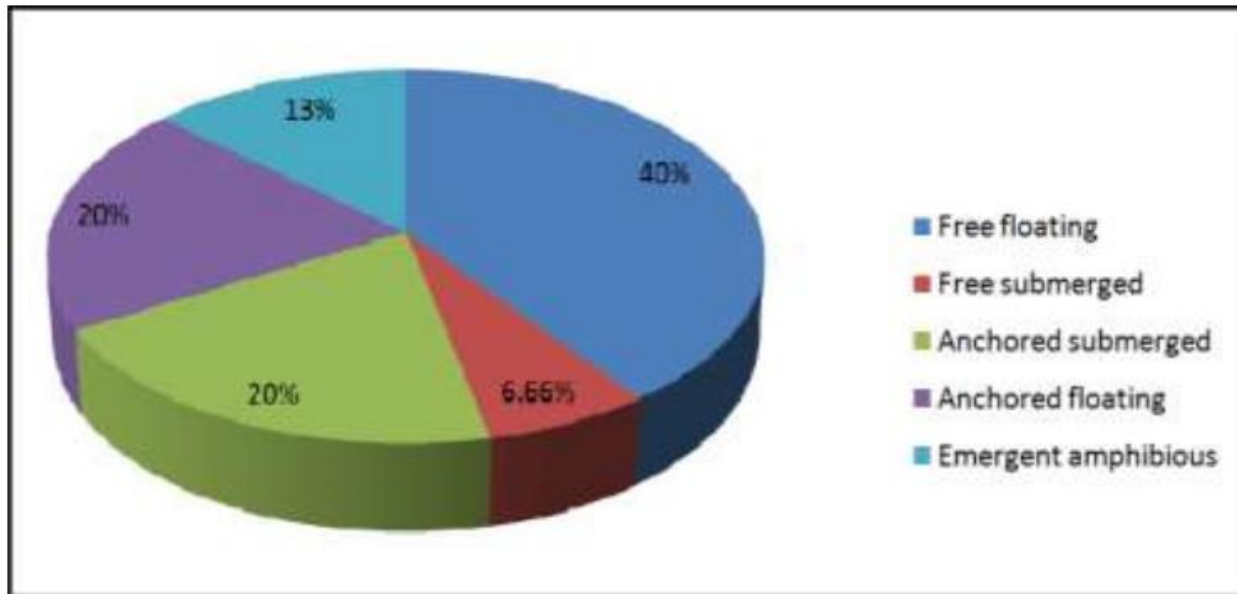


Figure 1: Analysis of Data based on Habitats showed by the aquatic Plants

DISCUSSION

Biodiversity has great importance for human survival and economic well-being and for the ecosystem function and stability. The importance of aquatic plant diversity for sustainable life support is an acceptable fact throughout the world. Although Rajasthan is considered as a desert state but it also has rich aquatic flora and biodiversity. During the present study total 15 species of aquatic plants were recorded and summarized them according to botanical name, family, local name and also by their description. Some reports published on the aquatic plants exclusively in Rajasthan state include Ajit Sagar Dam (Nair and Kanodia, 1959); Kota (Gupta, 1966); Bundi district (Maheshwari and Singh, 1974); Ghana Bird Sanctuary (Saxena, 1975); Pareek and Sharma (1988); Pareek A (1996); Jaipur district (Sharma and Kumar, 2012), Jhunjhunu district (Verma and Khan 2014) and Pilani BITS, (Khan and Verma, 2012).

The classification and distribution of aquatic plants in India have been reviewed in past by Agharkar (1923); Deb (1976); Joy (1986); Srivastava et al (1987); Jayanath (1988); Fassett (2000); Jain et al (2007); Sharma and Saikia (2010); Saini (2010); Pande and Mishra (2011); Dhore et al (2012); Chatterjee and Dewanji (2014).

S.N.	BOTANICAL NAME	FAMILY	COMMON NAME	HABITAT DESCRIPTION
1	<i>Ceratophyllum demersum</i>	Ceratophyllaceae	Jhanjhi	Free submerged Plants are rootless. Leaves are dark green in color and arranged in whorls on the stem. Spacing between leaf whorls is highly variable.
2	<i>Eichornia crassipes</i>	Pontederiaceae	Jalkhumbhi	Free floating Leaves are broad and large. Flowers are violet, blue. Roots are freely feathery, dark fibrous type.
3	<i>Hydrilla verticillata</i>	Hydrocharitaceae	Kureli	Anchored submerged Stem is long and branched with oppositely arranged leaves. Leaf is oval shaped with margins toothed.
4	<i>Ipomea aquatic</i>	Convolvulaceae	Kalama	Anchored floating Stems are long, hollow, allowing them to float. Leaves vary from sagittate to lanceolate, 5-15 cm long and 2-5 cm broad. Flowers are trumpet shaped
5	<i>Lemna minor</i>	Araceae	Pancha	Free floating Leaves are fronds which may grow singly or in group. Roots may or may not extend from the underside.
6	<i>Nelumbo nucifera</i>	Nelumbonaceae	Kamal	Anchored floating It is national flower of India. They have large, round leaves with microscopic hair. Flower are usually found on thick stems rising several centimeters above the leaves.
7	<i>Nymphaea nauchii</i>	Nymphaeaceae	Poothali	Anchored floating The leaves are broadly rounded, 25-40 cm across, with a notch at the leaf stem. The flower are 10-15cm diameter. It has blue petel.
8	<i>Pistia stratiotes</i>	Araceae	Topapana	Free floating Plants consists of distinct rosettes, light yellow-green leaves. Tufts of long unbranched, fibrous roots. Leaves have definite veins radiating from leaf base towards leaf margin.
9	<i>Polygonum spp.</i>	Polygonaceae	Gulabi	Emergent amphibious Erect, rooted herbaceous plant with alternate, oblong leaves. Flowers are small, clustered and generally pink colored. Plant may be emergent in shallow water or completely submersed with only the flowers above the surface.
10	<i>Potamogeton crispus</i>	Potamogetonaceae	Bihlongoni	Anchored submerged Leaves are thin, alternately arranged on the stem. Minute teeth visible along entire margin of leaf. Commonly grows early in the spring and dies back during midsummer. Fruits borne in spike above the water surface.
11	<i>Spirodela polyrhiza</i>	Araceae	Panivaragu	Free floating Plant has 2 to 3 rounded leaves, which are usually connected. It has several roots beneath each leaf. The under-leaf surface of plant is dark red.
12	<i>Trapa natans</i>	Trapaceae	Singhada	Free floating Leaves are large, triangular, fan shaped, have toothed edged. Roots are fine, long, many in number. Fruits are nut like.
13	<i>Typha spp.</i>	Typhaceae	Hangla	Emergent amphibious Long, slender, grass like stalks up to 10 feet in height. Inhabits wet lowlands and water up to 4 feet deep.
14	<i>Vallisneria americana</i>	Hydrocharitaceae	Fitagah	Anchored submerged Roots buried in mud with long, slender, ribbon-like, flaccid leaves. Flower visible late in summer.
15	<i>Wolffia spp.</i>	Araceae	Thali	Free floating Smallest flowering plant in world, Plants are rootless. The flower are produced in a depression on the top surface of the plant body.

Table 1: Aquatic Diversity in Water Bodies of Sri Ganganagar District (Raj.)

The documentation and proper assessment of aquatic biodiversity is dependent on respective areas and their habitat. Unfortunately, presently aquatic ecosystems are destroyed rapidly due to various reasons. The loss of biodiversity is mainly from habitat destruction, over-harvesting, pollution and inappropriate introduction of exotic plants and animals. The survival of native aquatic species is threatened and hence attention on the aquatic resources. Immediate steps are to be taken for their conservation and sustainable utilization. There is a need for increased legal protection, well designed management practices to conserve the aquatic biodiversity. The measure for conservation of aquatic resources should be taken up on priority by different government and non-government organizations for benefit of humanity.

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