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STUDIES ON AQUATIC PLANTS OF PERENNIAL LAKES OF NARNALA WILDLIFE SANCTUARY, AKOLA DISTRICT, MAHARASHTRA

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Abstract
The present paper deals with the aquatic plants and its role in understanding the wetland ecosystem dynamics and species composition of aquatic plants, seasonal distribution in the lakes of Narnala Wildlife sanctuary. The sanctuary consists of a wide range of vegetation growing at different locations. These wetlands show a plant diversity of 28 genera and 31 species belonging to 20 families. These aquatic plant species includes free floating, rooted floating, submerged and emergent species.
Keywords: Aquatic plants, Narnala Wildlife Sanctuary, Perennial lakes, Akola district

Introduction:

Lakes are complex ecosystems composed of distinct habitats influenced by biological, physical and chemical processes. Aquatic plants are those plants which actively grow continuously or periodically depending upon the availability of required amount of water. They occur submerged below or floating on the surface or growing up through the water surface. These plants play an important role in the structure and function of the aquatic ecosystem. Threats to fresh waters such as pollution of different kinds, unfavorable climatic changes, eutrophication, acidification, and alien species invasion lead to reduction in native plant diversity which also threatens the faunal diversity of aquatic ecosystem (Chambers *et al.* 2008). The fresh water ecosystems in Asia are no exceptions and they are also exposed to these serious threats. Conservation of freshwater biodiversity faces serious challenges because of lack of public awareness about its magnitude and importance (Dudgeon 2000). Aquatic flora of India is studied by various workers. Earlier, Subrahmanyam (1962) has described 117 aquatic angiosperms. Lavania *et al.* (1990) has compiled the wetland flora of India; Cook (1996) has published the aquatic and wetland flora of India. From plant biodiversity point of view, many of the perennial and ephemeral lakes of Tamil Nadu still remain unexplored. In this paper, for the first time we present a checklist of aquatic angiosperms of lakes of Narnala Wildlife Sanctuary, Akola district, Maharshatra, India.

STUDY SITE

Narnala is an ancient fort in the hills in the north of AKOT taluka at a point where a narrow tongue of Akola District runs a few miles in to the Melghat. This area is Southern part of Melghat Tiger Reserve. The area is well known for its richness of flora and fauna. The Sanctuary area has special historical, biological, mythological, archaeological, scenic and recreational values and is a point of attraction for the tourists and the people of Maharashtra. The rich and varied miscellaneous forests of the area provide natural habitat to birds and wild animals. The Government of Maharashtra's Notification No WLP/1096/CR-279/F-1 dated 2nd May 1997 declared the ancient Narnala Fort and its surrounding patch of thick green forests as the Narnala Wildlife Sanctuary. The plants are studied from Narnala Fort and the vicinity of the Fort. This area is rich in plant diversity. The sanctuary consists of a wide range of vegetation growing at different locations.

Narnala Wildlife Sanctuary is unique in possessing perennial lakes in the area. The vegetations of lakes and ponds are rich in aquatic flora and constitute very important resources of food and medicine for the tribal population. But these natural resources, have hardly been given due attention for scientific studies, and thus their potentialities remain still untapped. The importance of the aquatic flora in agriculture, pisciculture, and as a source of food and medicine can hardly be emphasized. Water plants are taxonomically different as there is generally a lack of adequate herbarium material and a paucity of critical studies in the development of various organs due to the high degree of adaptability in form and structure in relation to aquatic environment. The peak flowering time of the aquatic flora is generally during the monsoon but some exhibit freak flowering out of the season while others are constantly in flower throughout the year.*ife sciences Leaflets 3:54– 68, 2010.* ISSN 0976 - 1098.

The aquatic plants are the most important component of the aquatic ecosystem. They are used as producers and phytoplankton in the aquatic ecosystem. The aquatic plants are also produced carbohydrate with the help of sunlight, chlorophyll, carbon dioxide and water. They are *Ceratophyllum, Eichhornia, Hydrilla, Lemna, Nymphaea, Ottelia, Pistia, Potamogeton, Scirpus, Ludwigia, Vallisaneria, Wolffia* etc. The aquatic plants are increases productivity of aquatic ecosystem and thus help to maintain ecosystem balance.

Material and Methods

A study on the aquatic angiosperms throughout the Narnala WS was carried out. A total of 31 species under 28 genera belonging to 20 families were collected and identified. Plant species were collected as systematically as possible from the study area. The following data were recorded from the herbarium specimen, *i.e.* Date of collection, collection number, habitat, flowering season, vernacular names and distribution. The preliminary identifications can be confirmed by matching with the help of voucher specimens. The major identifications were made with the help flora of Akola district by Kamble & Pradhan (1988).

Results and Discussion:

The taxonomic investigation on the aquatic angiosperms in the Narnala Wildlife Sanctuary was carried out. A total 31 species under 28 genera belonging to 20 families were collected and identified. The submerged aquatic plants are produce oxygen in the process of photosynthesis at the littoral zone of ponds. This oxygen is control by the dissolve oxygen in the ponds. As a result the balance of oxygen in the water and this water is suitable for pisciculture. There are different types of aquatic plants, *i.e.* submerged; semi-submerged and free floating is used in the habitat and reproductive area of fish. Most of the aquatic plants of any aquatic environment are needed for fish culture. Some fishes are directly secretes of their eggs on submerged hydrophytes. Many fishes are lives on a part of decomposed aquatic plants. Ecologically the aquatic plants are a good oxygenator of water and are used by fish for food. However, the water and marsh plants are playing an important role to maintain the balance of aquatic ecosystem. In this research both of aquatic and amphibious angiosperm plants were included.

ENNUMERATION

1. Alternanthera sessilis (L.) R.Br. ex DC.

Family: Amaranthaceae

An annual floating herb, rooting at nodes. Leaves elliptic-lanceolate, entire, and acute. Flowers in axillary heads, white. Fruit an utricle, compressed, ovoid-orbicular or obcordate, margins often winged or thickened.

***2.Ceratophyllum demersum* Linn.**

Family: Ceratophyllaceae

Leaves densely whorled, variable in thickness and amount of toothing, often terminated by 1 or 2 sharp, pointed bristles. Flowers unisexual, male and female flowers at different nodes. Fruit a small nut let, green to dark pinkish in colour, sessile with persistent involucres, ovoid, compressed.

***3.Colocasia esculenta* Linn.**

Vernacular name: Arvi

Family: Araceae:

An perennial herb, usually tall and coarse, sometimes small and handsome, with tuberous rhizomes or a short, stout caudex. Leaves with stout petioles, sheathing below, lamina petal, ovate-cordate. Flowers monoecious. Fruit of small obconic or oblong barries. Seed oblong, sulcate.

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***4.Cynodon dactylon* Linn.**

Vernacular name: Durbaghas

Family: Poaceae: Herb, stem prostrate, leaves short, subulate, glaucous, linule hairy, spike green or purplish, rachis very slender. Spikelet about 0.21-0.25 cm. glumes I and II spreading ovate, acute; III much larger cymbiform, keel and margin scabrid.

5.Cyperus rotundus

Vernacular name: Lahali

Family: Cyperaceae

A glabrous floating sedge. Stolons covered by ovate, acute, striate, pale-brown scale. Culm triquetrous, steff, scabrid on angles. Leaves often as long as stems, linear to broadly linear and coarse, flattish-plicate, acuminate, light brown to purple brown. Inflorescence a compound umbel. Achenes oblong- ellipsoid or oblong, ovate, pale brownish, trigonous with concave sides, deciduous.

6.Cyperus rotudus

Vernacular name: Golamethi

Family: Cyperaceae

A tall, glabrous, ressh-like sedge. Stem trigonous at top. Leaves short, rarely half the length of stem. Inflorescence in a spike, spikelets spicate, rachilla of spikelets distinctly

winged, glumes approximately, closely imbricate.

***7. Eichhornia crassipes* (M art.) Solms.-Laub.**

Vernacular name: Jalkumbhi

Family: Pontederiaceae:

Aquatic, free floating herb. Leaves emerged, radical, with petioles spongy, short, and very much swollen in young specimens. Flowers 10-20, expanding and withering almost simultaneously, very showy, posterior lobe with a bright yellow, blue bordered median blotch. Fruit a capsule, linear-oblong.*fe sciences Leaflets 3:54– 68, 2010.* ISSN 0976 - 1098.

***8.Hygrophila auriculata* (K.Schum.) Heine**

Vernacular name: Talmakhna

Family: Acanthaceae: A stout, erect, hispid herb with usually fascicled, undivided stems. Leaves lanceolate, sub sessile, acute at both ends, sparsely hispid with long white hairs, whorls large, dense with straight stout spines. Flowers in axillary whorls. Fruit a capsule, 4-8 seeded.

***9.Hydrilla verticillata* (L.f.) Royle**

Vernacular name: Kureli

Family: Hydrocharitaceae

A glabrous, submerged weed. Leaves sessile, linear, green, often with reddishbrown dots and dashes, sharply serrate-dentate, acute. Male flower solitary in a spathe and female spathe with apex shortly bidentate. Fruit subulate, smooth or softly echinate.

***10.Hydrocharis dubia* (Bl.) Backer, Handb.**

Family: Hydrocharitaceae

A stoloniferous herb. Leaves ovate-cordate to broadly ovate, apex obtusely rounded to broad acute, veins parallel, curved; stipules 1 or 2, transparent, scarious. Male spathes longer than the female ones. Petals pale yellow or white. Fruit filled with mucilage.

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***11.Ipomoea aquatica* Forsk:**

Family: Convolvulaceae

A glabrous trailer on mud or floating on water. Leaves ovate, ovate-oblong, deltoid, lanceolate or linear, base cordate, sagittate or hastate. Flowers 1-few in axillary cymes. Fruit a capsule, glabrous, ovoid to globose.

***12.Ipomoea fistulosa* M art.**

Vernacular name: Beshrum

Family: Convolvulaceae

A shrub, branches ascending, usually fistular containing milky juice. Leaves ovate to ovate-oblong base cordate to truncate, acuminate, mature leaves pubescent below on the veins more or less glabrous above. Flower is pink in colour. Fruit is capsule.

***13.Lemna perpusilla* Torrey**

Family: Lemnaceae

A free floating herb. Fronds rather thin, solitary or in groups of 2-5, ovate to obovate or obovate-oblong; base strongly asymmetric, obtuse or slightly acute at both the ends, green. Stamen solitary. Fruit asymmetric, ellipsoid, laterally slightly compressed.

***14. Ludwigia perenis* L.**

Family: Onagraceae

A floating herb rooting at the nodes and with conspicuous white, erect, spindle shaped, mucronate pheumatophores arising in clusters at the nodes of floating stems. Leaves broadly oblong- elliptic, obtuse or retuse, main veins prominent. Flower white in colour and fruit a capsule.

***15.Limnophila indica* (L.) Druce**

Vernacular name: Karpur

Family: Scrophulariaceae

A simple or branched plant, smelling of turpentine, with a few upper opposite, entire leaves and numerous whorled, capillaceo-multifid ones at its base. Flowers axillary, solitary, rarely subracemose. Calyx narrow, hemispheric in fruit, lobes ovate, acuminate.

***16.Lippia nodiflora* Rich**

Vernacular name: Bhui-okra

Family: Verbenaceae

An annual herb, creping minutely strigose, leaves cuneate-spathulate serrate, peduncles axillary rarely opposite, bracts obovate shortly acuminate as long as the corolla tube.

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***17.Monochoria hastata* (L.) Solms.**

Vernacular name: Baranukha:

Family: Pontederiaceae

A perennial robust herb with often long rhizome covered with the remains of old leaf sheaths. Leaves many nerved, basal lobes divergent, petioles of radical leaves longer, broad and sheathing at the base, those of the floral leaves shorter, tumid above and embracing the short scape. Flowers in racemes or sub umbellate; perianth segments pale blue. Fruit a capsule, ellipsoid.

***18.Oxalis corniculata* Linn.**

Vernacular name: Khat buti

Family: Oxalidaceae*Life sciences Leaflets 3:54–68, 2010.* ISSN 0976 - 1098.

Herbs, with acid juice, leaves alternate, lernately digitate, often sub sensitive; stipules. Flowers regular, on axillary 1 or more flowered peduncles. Fruit a loculicidally dehiscent capsule with persistent valves.

***19.Ottelia alismoides* (L.) Pers.**
Vernacular name: Panikala
Family: Hydrocharitaceae
A submerged herb attached and rooted on the mud. The floating leaves broad ovate, sub orbicular or cordate-reniform, transparent to transluscent, dentate or entire, base cordate or truncate, apex obtuse, sometimes apiculate. Spathes peduncled, the sessile female and hermaphrodite ones 1-flowered, pedicilled male ones many flowered. Fruit oblong, apex attenuate.

***20.Nymphoides indicum* (L.) O. Kuntze**
Family: Menyanthaceae
A floating annual herb with several long branches which reach the surface of the water, producing a node with a tuft of roots, a cluster of flowers, a single floating leaf and a branch. Leaves orbicular, deeply cordate, with obtuse basal lobes and a triangular sinus and with somewhat sinuate margins. Flowers appearing above the water between the basal lobes of leaf. Fruit subglobose.

***21.Nymphaea nouchali* Burm. f.**
Vernacular name: Kamal
Family: Nymphaeaceae
Leaves are sagittate to cordate, sharply sinuate-toothed. Flower buds oblong, open flower 5-15 cm. across. Sepals oblong, obtuse, 5-10 ribbed, green or rarely reddish. Petals linear or ovate-oblong, white or red or any shade in between. Fruit a globose berry with persistent stamens.

***23.Panicum paludosum* Roxb.**
Vernacular name: Dalakri grass, Borati
Family: Poaceae *sciences Leaflets 3:54– 68, 2010.* ISSN 0976 - 1098.
A matted perennial grass, stem erect from a floating base, lower nodes spongy. Leaves linear or ensiform, serrulate, acute; sheath loose, ligule a ring of hairs. Panicle with long, spreading branches; spikelets lanceolate, upper glume orbicular and ovate; the lower lanceolate, palea minute or linear or 0. Stamens 3.

***24.Pistia stratiotes* Linn.**
Family: Araceae
A monoiceous, free floating, gregarious herb with offsets. Leaves sessile, obovate cuneate. Spathe small, shortly stalked, tubular below and open above, spadices subequalling the spathes. Stamens 2-8. Fruit few seeded.

***25.Potamogeton mucronatus* Presl.**
Family: Potamogetonaceae
Perennials herbs. Leaves many nerved, undulate, mucronate, blade twice as long as the petiole, lanceolate. Peduncle very long, spike of interrupted groups or whorls of flowers. Fruit orbicular, shortly beaked.

***26.Polygonum barbatum* Linn.**
Vernacular name: Biskatali
Family: Polygonaceae
An annual, erect or prostrate herb, branches erect, glabrous, internodes generally shorter than the leaves. Leaves sub sessile, lanceolate or linear-lanceolate, acuminate, entire, base tapering, ventral side pubescent. Nut trigonous, black.76 - 1098

***27.Sagittaria sagitifolia* Linn.**
Vernacular name: Muyamuya
Family: Alismataceae
A common scapigerous aquatic herb with long stolons ending in tubers. Leaves hastate, terminal lobes acute or obtuse, basal lobes finely acuminate. Flowers of the upper whorls male, of the lower female. Achenes obliquely obovate with entire or sub crenate wings. Seeds pale brown.

***28.Scirpus articulatus* (L.) Palla.**
Vernacular name: Patpati, Chechur
Family: Cyperaceae
A tufted perennial herb. Culms erect or recurved, terete, wide blew, transversely septate, hollow, Upper basal sheaths cylindrical, lower sheaths reduced and scale-like. Inflorescence a pseudo lateral head, located at the midway position of the culm, bearing spikelets in a dense cluster, bract 1, culm like, glumes ovate, imbricate. Achenes broadly ovate.

***29.Vallisneria spiralis* Linn.**
Family: Hydrocharitaceae
A fully submerged, tufted, stemless, stoloniferous, dioeciously herb. Leaves radical, linear, ribbon-shaped, sheathing at base, apex obtuse. Male spathe on a scape, ovoid, flowers many, white, stamens 1-3. Female spathe on long, slender, filiform scape; flowers solitary, style 3. Fruit 5-13 cm. long, the basal part enclosed in the spathe. Seeds numerous.

***30.Wolffia arrhiza* (L.) Horkel ex Wimmer.**
Family: Lemnaceae
Fronds 0.5 mm long, resembling small dots or grains floating on still water in the form of thick, green, granular mass, usually as long as wide, rarely somewhat longer, base and apex obtuse.

***31.Xanthium strumarium.* L.**
Vernacular name: Gokharu
Family: Asteraceae
An erect, hispid herb, unarmed, leaves petioled scabrid triangular-cordate or Orbicular lobed and toothed, base cuneate, head in terminal and axillary racemes, fruiting involucres ovoid or oblong, beaks erect or diverging. Pappus absent.

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