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Study of Invasive Plant Species Character of *Water Hycanith* from Ambazari Lake of Nagpur District, Maharashtra (India)

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Abstract:

Nagpur district lies between 20º35' and 21º44'N and 78º15' and 70º40'E in the plain to which it gives its name at the southern base of the Satpura hill. Its area is 3840 square miles. Nagpur is the third-largest city of the Indian state of Maharashtra. Plants that do not occur naturally in a region but proliferate in the area they have been introduced into a cause of several negative impacts in these new habitats are called invasive plants. The invasive plants species are naturalized plants that produced reproductive offspring, often in very large numbers at considerable distance from parents plants. In this article, efforts are taken to gather the information of character of *Water hycanith* which is the invasive plants species has great impact on the Ambazari lake of Nagpur District, Maharashtra.

Keywords: *Invasive plants species, Water hycanith, Amabazari lake.*

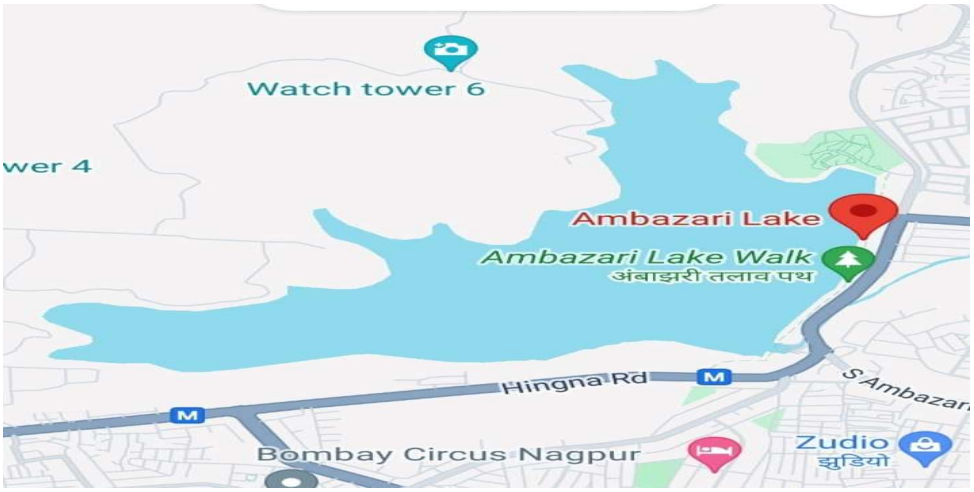
Introduction:

Nagpur is named after the great river Nag which flows through the city. The old Nagpur city (today called Mahal) is situated on North banks of the river Nag. The suffix pur means 'city ' in many Indian languages.

Nagpur city is dotted with natural and artificial lakes. The largest lake is Ambazari lake. Ambazari lake is situated near the southwest border of Nagpur , in the state of Maharashtra. The Nag river of Nagpur originates from this lake. This was built in the year 1870, under Bhosale rule, for supplying water to the city. This lake is surrounded by Mango trees, gaining the name Ambazari as 'Amba' means 'Mango' in Marathi. The lake also has a garden located just beside it known as Ambazari garden. The garden was established in 1958 on an area of 18 acres of land.

Ambazari lake is not just an ordinary lake .It is one of the largest artificial water bodies in the city of Nagpur. The lake receives water from the nearby Ambazari dam in addition to several small streams and rivers flowing within the lake itself.

The Flora surrounding it is extensively diverse with many species unique to this part of the country being observed. There is also a vegetation like trees and shrubs. There is a vast array of beautiful plants, from lotus flowers blanketing the lake's surface to lush grasses growing its banks. The lake also features plenty of trees, such as their state tree- the silk cotton tree as well as numerous palms and tropical plants. The visitors will delight in the biodiversity of this special place.



Characteristics of Water hyacinth species:

Pontederia crassipes (formerly Eichhornia crassipes),commonly known as common *Water hyacinth* is an aquatic plant native to South America, naturalized throughout the world, and often invasive outside its native range. It is the sole species of subgenus Oshunae within the genus Pontederia . Anecdotally, it is known as the **'terror of Bengal'** because it is an exotic shrub which is growing at an alarming rate on the surface of water body, due to its invasive growth tendencies. It inhibits the growth of other aquatic organism due to cut down of light and lack of oxygen.

Water hyacinth is a free-floating perennial aquatic plant (or hydrophyte) native to tropical and subtropical South America. With broad, thick, glossy, ovate leaves. Its may rise above the surface of the water as much as 1m(3ft) in height. The leaves are 10-20cm (4-8 inches) across on a stem, which is floating by means of buoyant bulb-like nodules at its base above the water surface. They have long, spongy bulbous stalks. The feathery, free hanging roots are purple- black. An erect stalk supports a single spike of 8-15 conspicuously attractive flowers. Mostly the flowers is lavender to pink in color with six petals. When the flower is not in bloom, *Water hyacinth* may be mistaken for frog's bit (Limnobium spongia) or Amazon forgbit (Liimnobium laevigatium).

One of the fastest growing plants known, *Water hyacinth* reproduce primarily by way of runners or stolons, which eventually from daughter plants .Every plant additionally can produce thousands of seeds each year. These seeds can remain viable for more than 28 years. The common *Water hyacinths* (Pontederia crassipes) are vigorous growers and mats can double in size in one to two weeks. In terms of plant count rather than size, they are said to multiply by more than a hundred folds in number in 23 days.

In their native range, the flowers are pollinated by long-tongued bees, ant plants can reproduce both sexually and clonally. The invasiveness of the hyacinth is related to its ability to clone itself, and large patches are likely to all be part of the same genetic form. It has three flowers morphs and is termed" **tristylous**". The flower morphs are named for the length of their pistils: Long(L), Medium(M),and Short(S).In the introduced range ,the M-morph prevails, with the L- morph occurring occasionally and the S-morph is absent altogether. Geographical distribution of these floral morphs indicate that founder events have played a prominent role in the species worldwide spread.

Impacts of *Water hyacinth* on the lake:

"*Water hyacinth* has a variety of negative impacts."

Once it introduced into freshwater environment, it forms dense, impenetrable mats which clog waterways, making boating, fishing and almost all the water activities is

impossible. These plants also reduces biodiversity by crowding out native plants at the water's surface and below. It blocks light and smothers beds of native submersed and vegetation. The *Water hyacinth* has since spread prolifically , due to a lack of natural predators, an abundance of space, agreeable temperature conditions, and abundant nutrients ,including increasing heavy metal pollution in the lake. Their mat-forming nature severely impacts biodiversity by preventing the entry of sunlight and oxygen to the bottom of water. Their growth prevents the natural flow of water in irrigation channels, obstructs smooth navigation and interferes with hydroelectric power generation. These plants also result in depletion of the dissolved oxygen levels in the water. The high oxygen demand can deplete the oxygen levels in the water, which is essential for fish survival. Consequently, many fish may perish due to insufficient oxygen. Furthermore, *Water hyacinth* can block sunlight from penetrating the water, hindering the reproduction process of fish and disrupting their habitats. The decaying process depletes the amount of dissolved oxygen in the water.

Effect of *Water hyacinth* on Human and Animal:

The toxic principle of these plants is very concentrated in the bulbs(verus the leaf or flower), and when ingested in large amounts, can result in severe clinical signs. Severe poisoning from *Water hyacinth* is often seen when dogs dig up fleshy planted bulbs or having access to a large bag. *Water hyacinth* bulbs have been known for years to cause skin irritation, contact eczema and respiratory irritation in humans. Piirila et al.(1998) were the first to document occupational asthma caused by hyacinth. Birch twig and marguerite most frequently induced symptoms, followed by strongly smelling flowers .Unspecific irritants caused symptoms in 98% of the asthmatics and in 67% of patients with rhinitis.

"If we handle *Water hyacinth* bulbs, they can irritate your skin." because the bulbs contain oxalic acid, which is also found in rhubarb.

Materials and Methods:

Water hyacinth is a floating aquatic plant which is most invasive species in the world. *Water hyacinth* is also known as one of the fastest growing plants. *Water hyacinth* plant is control by Physical, Chemical and Biological methods.

Physical Methods: In physical method the manual extraction is more effective than chemical and biological method for the removal of *Water hyacinth*. In Ambazari lake the manual work is done to remove the weeds, but yet it is not completed as the lake is vast.

Chemical Method: In Chemical method the spraying of chemical herbicides such as Glyphosate, Imazamoxi,2,4-D and Florpyrauxifebenzyl are found more effective in reduction of *Water hyacinth*. It found more harmful method for the micro-organisms and other non-target plants that provided habitat for the other organisms. It's also effects to the fish production.

Biological Method: Biological control methods agents require time for their impact to be observed but once established, populations usually remain present. The biocontrol agent will never completely eliminate, but it can reduce the plant below problem levels. While the development and implementation of biological controls take time, the long-term cost in management is often significantly less than other control measures and less harmful to the environment. Most of the above water parts of the plants are killed by forst during the winter. Natural increase and decrease of the weed will still occur, possibly seasonally or over a number of years, but level should be lower than before. The occassional massive seasonal flood, now largely tempered by dams, could have a large impact on plant and natural enemy populations.

Sample Collection:

Water hyacinth plant samples were collected from the Ambazari lake in October 2023 and(at site 3x3m^2 ,approx.1m deep,1.5m from the bank).The plants were transferred to the laboratory in polyethylene bags. Plants of similar shape, size (weight of each plant,200± 20g wet mass) and height(roots 21-23cm,aerial parts 25-26 cm) were selected and washed several times using tap and distilled water. The plant were rinse properly to remove all the

debris from roots and leaves. This plant is then preserved in a glass jar. The jar contain 40% formalin and distilled water(i.e it should be mixed at a ratio of nine parts water to one part formalin). The plant is preserved here for a long years for the study of their scientific characteristics.

Conclusion:

The Nagpur Municipal Corporation has been consistently removing *Water hyacinth* from Ambazari lakes, but lakes is still plauged by weeds .The NMC has identified that the weeds flows in from Wadi and MIDC areas, and they have formed a committee of experts to address the pollution source. The solid waste management department has removed 940 truckloads of weeds and used the Jaldost airboat system to aid in the task. To review committees have been formed to tackle the challenge, with the involvement of the MPCB, Neeri and other experts.

The flooding of *Water hyacinth* in Ambazari lake has now become a matter of concern for the civic body as well as for citizens. After cleaning the weeds flow the overflow spot of the lake, Nagpur Municipal Corporation (NMC) ,started removing weeds from other parts of the lake with the help of small boats. Ambazari lake overflowed recently in monsoon season due to heavy rains in city and huge amount of weeds obstructed the flow of water from the over flow side of the lake. According to environment experts, *Water hyacinth* also reduces biodiversity by crowding out native plants at the water's surface and below. It also degrade water quality by blocking the air-water interface and greatly reducing oxygen levels in the water, eliminating underwater animals such as fish."These weeds will never be eradicated completely, but management is necessary to control its rapid growth, as the mat it forms can double their size in 6-8 days."Water hyacinth plants should be control as it will affect the biodiversity of the ecosystem of lake.

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