Restoration and Rejuvenation of Natural Stagnant Water bodies

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The low lying areas and depressions of the landscape that hold water at least for sometime and support characteristic aquatic flora and fauna are referred to as stagnant water bodies

Stagnant Water bodies include wetlands and vary enormously in size, shape and depth, and usually have an inlet and outlet. Water bodies render a wide range of ecological services – holding flood water and recharge ground water to providing livelihoods of local communities.

Land degradation alone led extinction of 87% of world's wetlands. Developmental activities such as indiscriminate road construction, erection of bunds, discharge of sewage and industrial effluents, dumping of solid wastes and encroachments are threatening these valuable life supporting ecosystems. Some of these activities led to death of stagnant water bodies.

For example, Najafgarh Jheel in NCR , the flood plain wetlands of river Yamuna in the downstream of DND flyway and Neela Hauz lake were nearly dead due to discharge of sewage, dumping of solid waste and encroachment.

Najafgarh Jheel was located over an area of 1.5 lakh acres in the past and it was reduced to 900-1200 acres only and the rest was converted into agricultural fields and or human settlements. It used to receive the entire catchment from Aravallis.

The Jheel not only used to attract a large number of migratory birds and home for several resident birds but used to hold large quantities of flood water which prevented the submergence of vast tracts of Delhi and Gurugram city. It also used to recharge ground water which is the major source of water in the region . The existing Jheel receives the entire sewage from Gurugram and industrial effluents and it is nearly dead .

The flood plain wetlands of the river Yamuna in the downstream of DND flyway spread over an area of 167 hectares and used to hold huge quantities of flood water and recharge the ground water which is the major source of water in the area. Today the wetlands are highly degraded and receive 1000 mld of raw sewage from 11 drains. These wetlands are infested with water hyacinth and become major mosquito breeding centre.

The 167 ha of the floodplain wetlands has been notified by DDA as South Delhi Biodiversity Park. Restoration work has already been initiated, water hyacinth was removed from 20 ha of wetlands. In-situ Constructed wetlands are being developed to treat the sewage from 11 drains.

Neela Hauz is a stagnant water body in the shallow depression surrounded by low lying Aravalli hills of Southern Ridge, and entire precipitation of the hills used to drain into Neela Hauz and the fresh water was used to supply drinking water to South Delhi at one time. Over a period of time due to urbanization, the source of fresh water to the lake was disrupted and the only source of water today is the raw sewage and raw sewage + STP treated water of 1 mld .

Further , the lake size was reduced from more than 10 ha to less than 4 ha and most of it was filled with solid waste. When the road bridge of Aruna Asaf Ali road was constructed , the lake was dead. The Neela Hauz citizen group mostly consisting of JNU residents and nearby Kishangarh area filed a case against PWD at Hon'ble High Court of Delhi with a prayer that Neela Hauz should be restored back to its past pristine glory.

The High Court passed an order that the Neela Hauz should be restored to its pristine glory. Since the land belongs to DDA, the PWD paid the restoration costs to DDA. DDA declared the area as Neela Hauz Biodiversity Park and asked CEMDE to develop it.

Our first task was to desilt the lake upto 4 m depth in the centre and with decreasing shallow depth towards the shore line. The excavated material was used for making embankments which were aesthetically landscaped. About 15000 saplings of 24 native tree species belonging to 6 communities were planted . In other words a green way with walkway has been developed along the embankments of the lake. A scented garden, a butterfly corner and small recreational areas have also been developed.

Our challenge is how to rejuvenate the lake which receives 1 mld raw sewage and raw sewage + STP treated water . We designed a constructed wetland system to treat sewage before it enters into desilted lake.

The constructed wetland is developed in situ with the following components:

(i) Two oxidation ponds of 3’ depth

(ii) A gradient channel with 5 ridges of loose large pebbles of 150-200 mm size

(iii) Three physical treatment channels each with 3 ridges of 100 mm , 80 mm and 60 mm size loose pebbles respectively.

(iv) A constructed wetland with 10 to 12 furrows for growing plants and ridges of loose gravel of 20-25 mm size. About 25 plant species are used in constructed wetland

(v)A cascade outlet with stones and pebbles

(vi) A natural wetland

With zero energy and continuous flow of sewage, the constructed wetland developed make 1 mld sewage into a clear water that has the same quality as that of river water.

The sewage before treatment has 40-80 mg/l BOD, 150-200 mg/l COD, 120 mg/l TSS and zero DO and after treatment the same water has > 4 mg/l BOD, >10 mg/l COD, 20 mg/l TSS and 5-8.5 mg/l DO

The Neela Hauz Lake has clean water and attracts a larger number of resident and migratory birds. It has also a large number of fishes, and has high biological productivity.

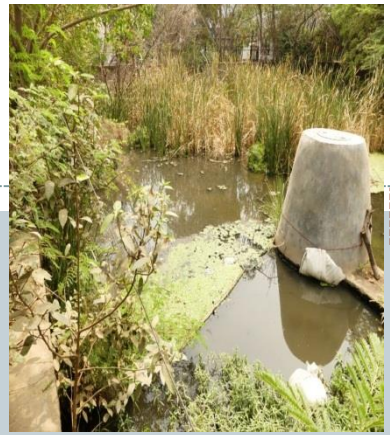
Today Neela Hauz Lake Biodiversity Park has become destination not only to the public and tourists but also students and professionals in the area of bioremediation and waste water treatment.

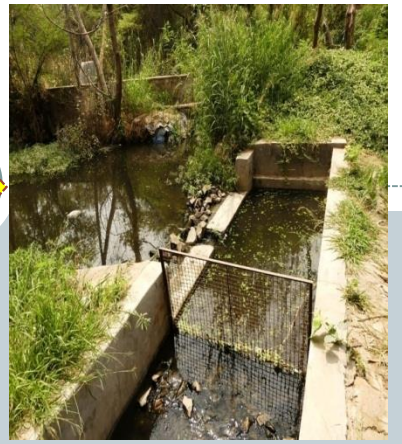
Dead Neela Hauz Lake before rejuvenation showing solid waste dump

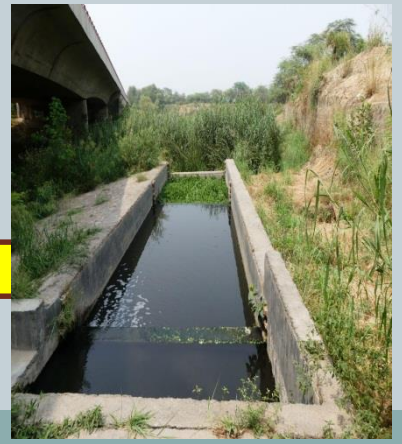
Overview of the Lake

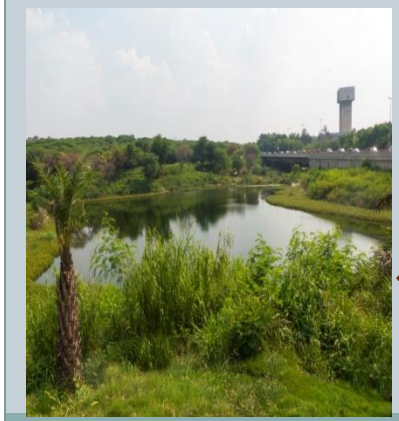
Butterfly corner at Neela Hauz Biodiversity Park

Grenway with a walkway on the embankment of the lake







Restored Neela Hauz Lake with rich Avi Fauna

Neela Hauz Lake surrounded by Sanjay Van

A view of the restored lake with the vegetation on the embankment


Neela Hauz Lake after restoration with clean water

TREATMENT WATER FLOWING TO THE LAKE FROM THE WETLAND