Ecological status and Rejuvenation Strategy of Ekrukh Lake

- Site Visit Report

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Ekrukh Lake

The lake is a natural wetland and is located over an area of 1865 acres; it is located 8 km north of the city. The waterbody used to supply drinking water to the villages as well as to the city of Solapur at one time. It also used to meet irrigation requirements of the huge catchment area in the past, but today the lake is nearly dead.

On the west, the lake is demarcated by a bund road, which is about 13 m high from the lake bed level. There is an outlet of 200 m width over which a culvert was constructed. This outlet leads to a low lying areas that were a part of a large natural storm drain at one time but are now converted into agricultural fields. The bund stretches towards north to a distance of 1.3 km. On the south, the shoreline is encroached and Talehipparga village is also located at the south. The encroachments along with the village generate raw sewage which directly enters into the lake. We identified 4-5 such drains and the total flow would be 1-2 MLD. The sewage from these open unlined sewers can be remediated using constructed wetlands, as there is adequate space outside the village limits but abutting upper limits of the monsoon waters of the lake.

On the northern side, the entire lake bed was dried up and was converted into agricultural fields. One large village is situated at the northern end. We did not find any drains nor release of sewage into the lake at the northern part of the lake. On the eastern side of the lake, there are agricultural fields and one village discharges raw sewage into the lake.

Except some puddles of water in the lower gradient of the lake, virtually there was no water in the lake.

There are three ranney wells which provide ground water for irrigation. These wells also dry up in the months of April- June.

The lake is about 150 year old and used to generate many ecological functions and provide livelihoods to locals. But today, the lake has virtually become a vast agricultural field and is no longer able to generate ecosystem services including the recharging of ground water which is the major source of water in the area. The reasons for the death of lake include the following:

(I) Siltation of lake bed from erosion of soil from catchments, surrounding agricultural fields, and barren embankments. In fact, the lake was filled up to a depth of 20 feet with silt as per the information provided by village elders.

(II) The lake bed has reached to the gradient that is similar to that of agricultural fields. The lake bed has become shallow to such as extent that the villages are flooded due to monsoon waters enter into lake. There is reduction in the recharging of ground water.

(III) The inlet located at the northern end of the lake was disappeared, as the villagers constructed a series of check dams in the upstream for irrigation purposes.

(IV) Indiscriminate road construction also disrupted the natural drainage pattern.

(V) Encroachment of the shorelines of the lake at southern end of lake.

(VI) Invasion of the lake area by *Prosopis juliflora* which takes large quantities of ground water during dry season.

(VII) Discharge of raw sewage from the villages located along the embankments.

The adverse impacts of the degradation of lake are as follows:

The degradation of the lake led to severe water scarcity into the villages. In fact, in some villages there is an acute scarcity even for drinking water. There has been depletion of ground water. Since the lake is dried up, no water is available for cultivation during summer months.

Strategies for Rejuvenation of the Waterbody

1. Desilting of the lake from one end to the other end upto 20 ft depth is needed. The desilted material should be used as natural embankments with openings for inlet and outlet. This embankment should have natural vegetation in some segments. In areas close to the villages the embankments should be developed into fruit gardens.

   The desiltation of the lake is a massive effort and needs large financial support from World Bank/ ADB etc

2. *Prosopis juliflora* should be removed from the entire lake.

3. The elevated portions should be used for development of grasslands with patches of fruit gardens and native forest species. These would bring back the biodiversity, which the lake has lost. This can be then developed in to a tourist spot as well.

4. One specific area (around 100 acres) should be developed as a recreational park for the city. In this area limited boating should be opened.

5. The encroachments should be removed.

6. The agricultural runoff which enters into the lake should be bioremediated before it is discharged into the lake. This should be done using plants which assimilate nutrients like nitrates and phosphates leading to prevention of nutrient loading of the lake and also bioremediate the water.

7. Development of constructed wetlands for treatment of sewage that enters into the lake.

Development of Constructed Wetlands for Treatment of Sewage that Enters into the Lake from Cluster of Villages and Encroachments

1. Chanelization (upto 1-2 ft deep and 1-2 ft wide) of drains originating from houses and connecting them in a way that there will be only four major drains that will discharge sewage from the villages into the lake. Lining the channels with stone may help in frequent desilting of the channels. Alternatively, sewer lines of appropriate diameter (8 inches diameter) may be laid to carry sewage upto the elevated portion of the lake.

2. The four major drains will be brought to the elevated portion of the lake. Two major sewer lines from two clusters of houses discharge their contents into one pond and another two drains discharge into another pond. These ponds serve as oxidation ponds. These ponds already exist as marshy area. The size of each pond will be 3 ft to 4 ft deep and 10 ft to 15 ft wide.

3. Water from the oxidation pond will flow into the first chamber (depth: 3ft; length: 5-6 ft; width: 4ft). The oxidation pond is separated from the first chamber by gabion of 4 ft height and 3 ft wide. The first chamber will be separated from the next chamber by 4 ft high gabion, made of boulders, embedded in a mesh. The size of second chamber is same as that of first chamber. It filters large muck. The bottom of this chamber must be covered with pebbles (upto 3 ft height).

4. The third chamber will be covered with smaller pebbles and gabion height will be 4 ft height and 3 ft wide. The third chamber will have the same sizes but will have different sizes of pebbles.

5. The third chamber will be separated from the constructed wetland by an RCC wall and the water flows over the RCC wall into constructed wetland. The height of RCC wall will be 3ft.

6. The size of the constructed wetland will be: depth 4 ft; length 20 ft and width 15 ft. It will have a set of 6 furrows and ridges. Each furrow and each ridge will be 3 ft wide. Each ridge will have gravel (20 mm size) of 4 ft high. Furrows will have aquatic plants (*Typha; Phragmitis, Ipomoea, Alternanthera, Polygonum, Bacopa, Paspalum* and some other local species). This wetland must be lined with RCC wall on the sides (not bottom).

   Water will flow through all the ridges and furrows and the treated clean water will be collected in a pond (6-8 ft depth; 20 ft length and 15 ft width) or released into the lake itself.

Visit to Haglur Village and Action Plan for Treatment of Sewage

The team visited Haglur village located 5 km east of Ekrukhlake. The village has been fragmented by the national highway and exists in two hamlets. Each hamlet has about 200 families. Presently the drainage of each village, including sewage is channelized through a pipe which connects to the roadside storm water drain. However, in some houses the sewage runs through open drain. The villagers expressed that each house would like to have soak pits. We examined this option,

along with the option of developing a constructed wetland at the end of the main sewer, which passes along the roadside. The soak pit system consists of a pit having stones and sand filters. The soak pit system is more costly and does not biodegrade the pollutants which sewage has. Soak pits will get choked very fast, if the sewage has high load of suspended material. It also requires energy to lift the water from the soak pit. The team was not clear on the reuse of water just after physical filtration.

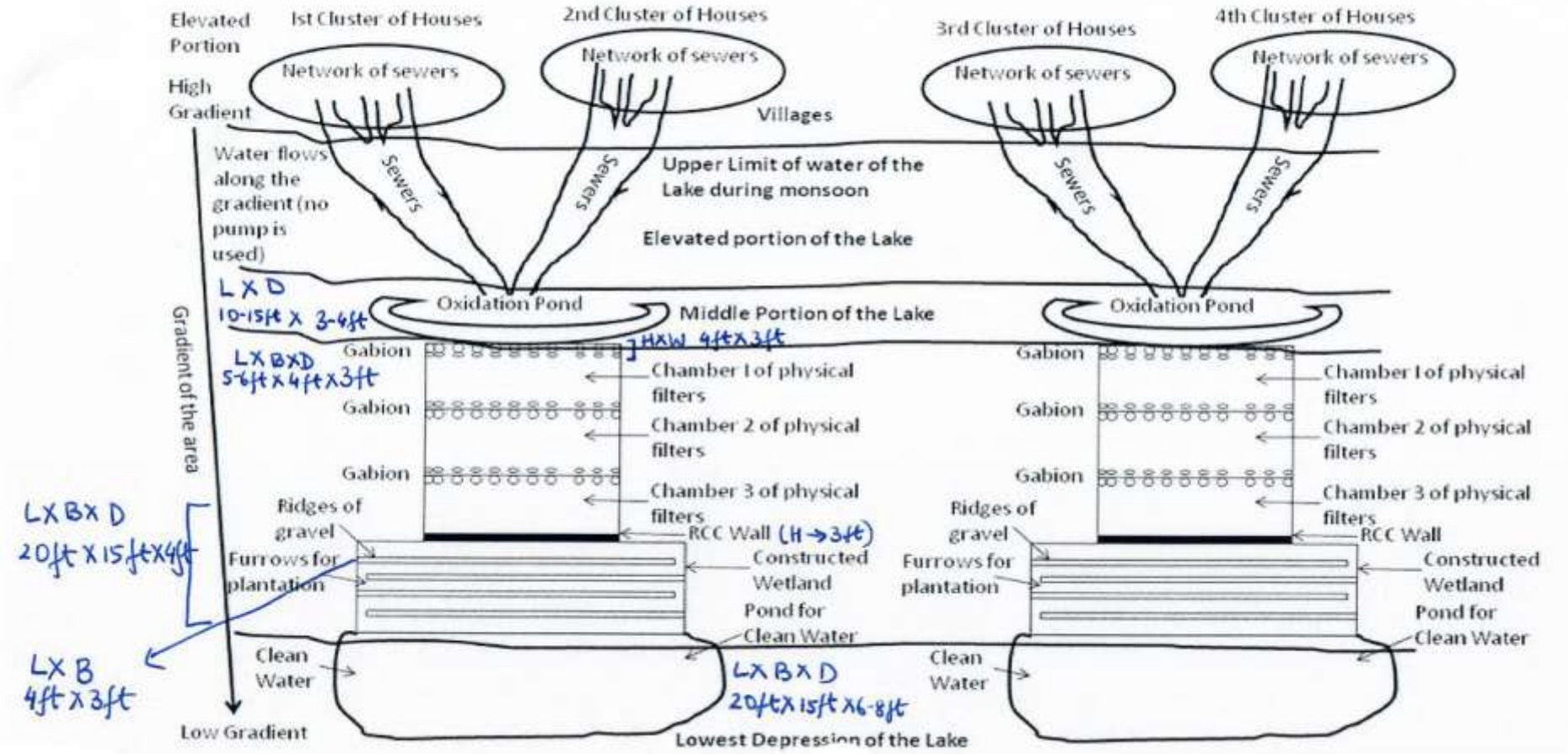
On the other hand, the constructed wetland system, which combines physical and biological filters are effective in the treatment of sewage and biodegrade most of the pollutants and eliminate coliform density. In this way the sewage water is nearly cleaned, can be brought to level of river water and safely discharged into the lake or reused for irrigation. Its cost is one-fourth the cost of soak pits.

The only limitation in this village is the availability of space, which is under private ownership. Atleast 0.2 acres is needed. The villagers should procure this land and give it to the project. If this is not possible, the sewage can be channelized through pipeline/open drain through agricultural lands to the lake side, where the constructed wetland can be easily developed on a small land.

Visit to Siddheswar Lake

The team also visited Siddheswar Lake. This lake is dead and has very small amount of water (only 2-3 ft deep) and the water is full of algae and gives foul smell. A lot of clothes were seen floating in the lake end solid dumps were also noted. The attempted rejuvenation by the city is confined to concretization. The desilted material should have been used to develop islands in the lake. The sewage water must be treated within the lake through a constructed wetland system. The barren slopes should be planted with ornamental shrubs and the lake embankment should have native flowering trees (greenways).

Schematic Layout of Constructed Wetland System at Ekrukh Lake



Note: The sizes of different components are given in the Report.