

Reclamation of Nanjarayan Lake by Using Bioclean STP Treatment Tirupur Corporation in Tamilnadu, India

Mohan.S¹, Sivakumar.C.T², Tamilchelvan.P³, Vidhya.K⁴, Muralimohan.N⁵

Abstract— The demand for water in and around Tirupur region is very high as the water bodies are very few in number even the available water bodies are being polluted by dying unit effluents and other harmful industrial effluents being let out into the available water source due to lack of waste disposal units. Nanjarayan Lake is a 440 acre reservoir in the outskirts of Tirupur town, near Koolipalayam, off Uthukkuli Road. It is officially known as “Koolipalayam Reservoir” or “Sarkar Periyapalayam Reservoir”. Going back in history, we come to know that this tank was built by a local king called “Nanjarayan”, over 400 years ago. Hence the tank has been renamed as Nanjarayan Tank in the recent past. This tank has been a home for several inland and migratory birds for centuries. The water source is the Nallar River, flowing from the Avinashi big Tank and few sewage canals, carrying the effluents and sewage from Tirupur town. Eventually the water level has never come down due to the above sources. The flora and fauna of this tank attracts as many as 135 species of birds from all over. Inland birds like Spot-billed Pelicans, Painted Storks, and etc. It also brings in a huge number of species from other parts of the World during the winter. Starting from November, every year, various birds flock in to Nanjarayan Tank and spend their winter and leave back to their home by the end of March. A new method called Bio-Ozolyte method has been implemented and tested by us to treat and restore the water in the reservoir. This method involves three treatments they are biological treatment, Ozone treatment and Anoyte treatment. This method increases the dissolved oxygen level in the water and makes the water favorable for existence of organisms and fit for usage. If this reservoir is restored, all water demands in and around Tirupur can be met.

Index Terms— Nanjarayan Lake, Biological treatment, Reclamation, Biodiversity, Bioclean STP, Bio-Ozolyte, Anoyte treatment

1 INTRODUCTION

Lakes are the important water resources which support millions of people, but due to rapid urbanization and industrialization, many thousands of lakes adjacent to urban center has already been closed. The remaining lakes are most useful for holding domestic waste water and dumping of solid wastes and debris.

After the severe crisis facing in water supply, local bodies, Irrigation Departments, State and Central governments and other NGO's are showing keen interest on cleaning lakes and restoring the existing remaining water bodies. It is pathetic to see that even at this stage the action plan proposed to restore the polluted lakes involves only structural oriented activities and not concerned with ecological components like flora and fauna and environmental aspects.

The structural components like de-silting strengthening sluice and weir repairs play critical role in the action plan. The action plan does not address the waste water, solid wastes, public awareness, training etc. Since the civil engineers involving in the restoration program do not have any idea about basic environmental and ecological issues and the need of remedial measures for keeping the lakes pollution free.

1.1 Environmental status of Tank

The urban tanks water quality is totally deteriorated due to the discharge of city domestic waste water. The city's entire wastes are finding their ways in the tank. Dumping of solid waste and discharge of waste water draining in to the tank is spoiling the water quality standards of the tank. The ground water of that area is also deteriorated due to the pollution. But the Environment of the tank is degraded due to the improper management of wastes generated in the city. Hence the restoration of tank in terms of water quality, Biodiversity and Ecology is to be considered.

1.2 Objective of the Plan

This proposal describes the action plan for improving the degradation of Environment in tank. The objective of the restoration program is listed below.

- 1) To increase the storage capacity of the Tank (Structural components)
- 2) To Stabilize the Bunds and repair the sluices. (Structural components)
- 3) To improve the water quality of the lake. (Non-Structural components)
- 4) To Improve the Bio Diversity of the Tank. (Non-Structural components)

2 STUDY AREA AND SAMPLE LOCATION

2.1 Study Area Details

Nanjarayanlake is located in Tirupur district. It is located in the latitude 10°59'46" and longitude 77°01'11". The registered

- **Mohan.S¹:** Assistant Professor, Department of Civil engineering, Mahendra Engineering college, Namakkal, Tamilnadu, India, Mobile No:09629550388. E-mail: amumohans@mail.com
- **Sivakumar.C.T²:** Professor, Department of Civil engineering, Mahendra Engineering college, Namakkal, Tamilnadu, India, Mobile No:09442130662. E-mail: sivakumar@mahendra.org
- **Tamilchelvan.P³:** Assistant Professor, Department of Civil engineering, Muthayammal College of Engineering, Namakkal, Tamilnadu, India, Mobile No:09025695756. E-mail: ptamilchelvan@gmail.com
- **Vidhya.K⁴:** Professor/HOD, Department of Civil engineering, Mahendra Engineering college, Namakkal, Tamilnadu, India, Mobile No:09842022047. E-mail: vidhya22047@gmail.com
- **Muralimohan.N⁵:** Associate Professor, Department of Civil engineering, K.S.R College of Engineering, Tiruchengode, Tamilnadu, India, Mobile No:08754666728. E-mail: muraling83@yahoo.co.in

ayacut is 845 acres. The combined catchment area is 11.779 sq.miles. The total water spread area is 1.153 sq.km. Capacity of the tank is 52.27 m.cft. Nanjarayan Lake is divided into two by a railway track running in between. The domestic sewage inlet is from the surrounding areas.

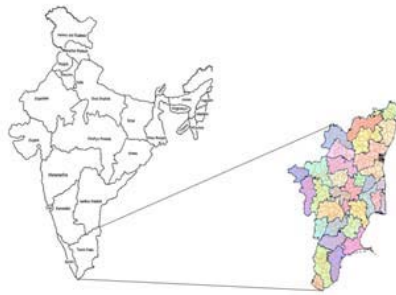


Figure: 1 India, Tamilnadu

Catchment area 4.144 sq. km (1.60 sq miles), lake bed area – 243.35 acres (10.60 msqft), current lake bed – not available (RTI), current storage capacity – 42.4 mcft, full tank level (FTL) – 10.25 m (37.50 ft), tank bund level – 13.87 m (45.50 ft), maximum flood level – 12.04 m (39.50 ft), bund width – 1.8288 m (6 ft), lake bund length – 700.13 m (2297 ft), lake shoreline length – not available (RTI), roads there is a WBM road which is running along right & left flanks of tank., size right side 1000m x 6m = 6000 m², size left side 1000m x 6m = 6000 m², biodiversity study has to be taken on trees, plants, birds, fishes, insects, amphibians, reptiles, etc.,



Figure: 3 Tiruppur district

2.2 Inlet and Outlets

There is no anaicut as the lake is a Rainfed one. No of inlets – not available (RTI), no of outlets – 3 (1 sluices + 2 weirs), encroachments no, agriculture – 108 acres are irrigated thru two sluices (RTI). Fishing – no, nearby institutions, industries there are quite a few textile processing units and textile garmenting industries, buildings, pumping stations and surrounded by lots of houses near to the lake.



Figure: 2 Tamilnadu, Tiruppur



Figure: 4 Nanjarayan reservoir: Satellite view

2.3 Bio clean STP

Bioclean STP is the most advanced microbial product to bring about a revaluation in waste water treatment. The microbial activities there by increase the efficiency of treating water at the least possible cost. They have the ability to degrade the number of pollutants. Each gram of bioclean STP may contains upto 96 different strains of bacteria. All the bacteria present in bioclean STP are highly stable.

Bioclean STP is a unique blend of all natural bacteria and enzymes used to eliminate waste buildup in plumbing and septic systems. Our enzyme concentration is the most powerful on the market and is delivered to you in powder form to retain potency and maximize effectiveness. Unlike liquid treatments which usually contain 1 or 2 types of enzymes, Bioclean STP powdered form contains 4 different types. This allows it to treat the four types of waste (protein, grease, carbohydrates, fibre) found in every system.



Figure: 4 Bio clean STP

2.3.1 Effective

Within an hour after pouring the bacteria into the drain, the bacteria begins to eat their way into the waste that has accumulated on the sides and top of the drain pipe. This is their natural food. They digest the waste and spread throughout the system, cleaning it completely.



Figure: 5 Bio clean STP powder

2.3.2 Safe

Bioclean STP is non-poisonous, it creates no heat, no fumes, no boiling. It does not attack live tissue in inorganic materials, only organic wastes like grease, hair, food particles, paper, cotton & sewage. This makes Bioclean STP safe for people, plumbing and the environment. Bioclean STP changes the waste particles into water, carbon dioxide and mineral ash which run harmlessly out of your waste system. These elements are then available for plant life.

2.3.3 Working of Bioclean STP

In nature, all animal and vegetable matter from insects to mighty oaks is broken down and recycled into plant food by enzymes and bacteria. Bioclean STP uses this same principle to biodegrade animal and vegetable waste in pipes.

Like all living things, bacteria must eat to survive. Fortunately, certain types of bacteria will use the grease, hair, soap film and organic waste that tend to clog peoples drains, for food. Enzymes act like short order cooks. They prepare food for bacteria by breaking large molecules down into a size the bacteria can "swallow". Each enzyme works on one specific type of molecule. For example, the protease enzyme only works on protein. Lipase works only on fats.

When mixed with water, Bioclean STP immediately goes to work. The enzymes are very fast and start breaking down waste on contact creating food for the bacteria. Bioclean STP contains billions of bacteria and as they eat, they double in number every 30 minutes. Each one eats its weight in waste every minute - and best of all, they never sleep unrestricted by gravity, and they spread through the entire plumbing system, devouring all the organic waste.

Bioclean STP contains not only potent enzymes, but also contains bacteria that outperform the coliform species in very important ways. They are high producers of enzymes and they are acclimated so that they feed on a larger variety of materials in the waste such as fats and grease, vegetable oil, paper, detergents, fabric softeners, aliphatic and aromatic organic compounds as well as synthetic organics present in sewage. Bio-Clean digests 100% of all biodegradable waste.

More complete digestion also means fewer undigested solids leaving the tank. These solids would otherwise form a black gooey accumulation in the septic field and prevent water absorption by the soil. Therefore, Bioclean STP extends the life of a septic field.

Most likely, it is several feet of pipe that is filled with firm "sludge", and it may take several days for the bacteria to eat through this long blockage. Therefore, it is suggested that a mechanical cable be used to restore the flow. Then begin Bioclean treatments to remove any remaining waste build-up. Regular maintenance treatments will prevent new build-up. Most people notice improvement in a day or two. With proper application, results are guaranteed in one to three weeks. The cleaning process is not completed with the initial five day treatment. The time is determined by the type of material the buildup is comprised of (grease, soap, and hair) and the length of the lines hair takes the longest to digest.

The strongest chemical in the world can't climb the side

walls of horizontal pipes. Gravity makes all chemicals run along the bottom. Chemicals remove much waste in vertical pipes because they flow through so quickly. The bacteria in Bioclean STP are live and will go anywhere there is food.

All anti-bacterial products such as Chlorine, germicidal products, anti-septics, sanitizers, chemical drain openers, paint, lye, acids, cationic surfactants and food preservatives. And in general, anything that is inorganic (not biodegradable)

3 EXPERIMENTAL INVESTIGATION

3.1 Safe Sample from Nanjarayan

Nanjarayan lake is located in the Tirupur district, Tamil Nadu, India. It covers an area of 4.144sq.km.



Figure: 6 Site inspections

The Bio Ozolyte Technology is effectively used and employed in Nanjarayanlake. The sewage treatment plant in the Nanjarayanlake consists of the following components.

3.2 Collection of Sample

The initial collection of sample was carried out was for 5 litres of the polluted water due to various pollutants.



Figure: 7 Collection of sample



Figure: 8 adding Bio-clean STP powder

3.3 Biological Treatment Using Bio-Clean STP

- Bio clean STP is available in liquid and powder form.
- A Bio clean STP will have a minimum life of 5 years.
- The microbes culture and treat the water when it is provided with an external aeration.

3.3.1 Treatment

- Requirements : 1) Bio-Clean STP.
2) Fish Tank Aerator
- Initial color of raw Water sample : Dark Green
- Duration of aeration : 3 Days
- Final color of Bio-Treated Water sample : Dark yellow
- Amount of water treated : 1 litre

3.3.2 Procedure

- Take 1 litre of the raw water and transfer it to a separate bottle.
- Adding bio clean STP in the 1 litre of raw water
- Now provide aeration for 3 days.
- Observe the change in colour



Figure: 9 Aerated ozonizing

3.3.3 Ozonising Centrifugal Aerated Treatment

- Instrument used : Ozone generator
- Amount of raw water treated : 1 litre
- Time set for ozonised aeration : 10 minutes



Figure: 10 Aeration process

In Bio-Ozolyte treatment, the main component which is used to treat the water is microbes. It directly degrades the organic as well as inorganic pollutants rapidly without any chemical interruption, so the water gets purified naturally. The quality of effluent is good and also there will be no harmful impurities in the effluent. Thus it can be used for numerous applications.



Figure: 11 Bio treated water using STP

3.4 Analyte Treatment

This treatment was carried out on the same day near the site.

3.4.1 Chemical used : Analyte liquid

3.4.2 Quantities used:

1. Raw water – 1 litre (two bottles of 500 ml each)
2. Analyte Liquid – 5 ml to 500 ml of water

3.4.3 Procedure:

- Separate the 1 litre of raw water sample into two bottles of 500 ml each.
- Add 5 ml of Analyte liquid to 500 ml of raw water in one bottle.
- The bottles are kept near each other and at the specific intervals of time, the bottles are photographed.
- The time take for the sample to lose its color is noted.

3.4.4 Theory:

- Analyte liquid is obtained by altering the chemical property of water into charging the water molecules corresponding to anode.



Figure: 12 Anolyte liquid added to the raw water sample



Figure: 13 Change in color after 16 minutes



Figure: 14 Change in color after 40 Minutes

3.5 Method for Treatment

3.5.1 Biological Method:

Biological method is a simple cost effective technology and it could be used for wastewater treatment. Conventional technology Aerated lagoon and oxidation ponds ASP, TF and RBC are working on the biological principle only. But these tech-

nologies also need huge land area and heavy mechanical and electrical equipments which boost the capital cost. So addition of cultured microbes in the form of powder, liquid and block adding into waste water treatment system is a New biological process. Adding of microbes in the waste water treatment process will help to increase the efficiency of the system and reduce the capital cost of the plant. According to the type of wastewater, combination of powder type microbes, liquid type microbes and block microbes could be used.

3.5.2 New Biological Concept

Biological method is a natural way for cleaning the polluted water. Microbes powder, liquid is a powerful product infused with specific natural microorganisms. These microbes are dormant in the powder, liquid and blocks and get activated when immersed in water. Natural microbes need acclimatization period of three weeks to get activated to treat the pollutants.

Biological technology is widely used for treating sewage water and found the results encouraging. The test results proved reduction in the levels of BOD, COD, Turbidity, TSS and bad Odour. Even the ASP and TF are working on the biological principle only. But daily addition of microbes is not practiced. In the new biological system addition of microbes is essential.

For treating any waste water or water body's only one technology will not solve the problems. The sewage water is draining in to the Cooum River on both sides of banks. The Colour, BOD, COD, TSS, TDS, Odour and Bacteriological contaminations are the major pollution issues in the river. So the treatment shall be selected for treating the inlet drain water. Here we have selected the Bio-Ozolyte technology which is a combination of Biological, Ozonization and Anolyte liquid technology blending for treating the inlet drain water before entering in to the lake.

4 RESULTS AND DISCUSSIONS

The Raw waste water and the treated water sample were collected and given for testing to our college Lab. The results received from the lab were enclosed. The results showed that the parameters as per the PCB norms as shown in the table.

Table: 1 Raw water

S.No	Parameters	Units	Result
1.	pH	mg/l	9.20
2.	EC	mg/l	5160.92
3.	TDS	mg/l	3400.00
4.	Chlorides	mg/l	1697.34
5.	COD	mg/l	220.00
6.	BOD	mg/l	52.60
7.	E.coli	p/a	Absent

*Non E.coli colonies present

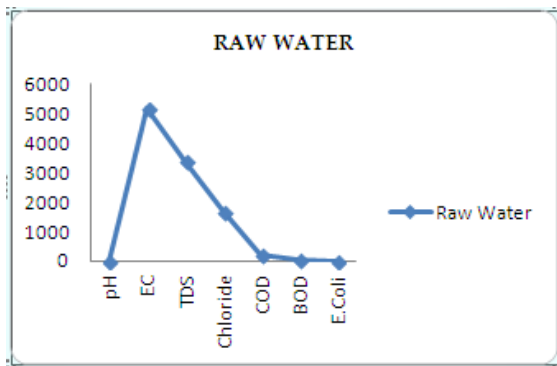


Figure: 15 Raw water

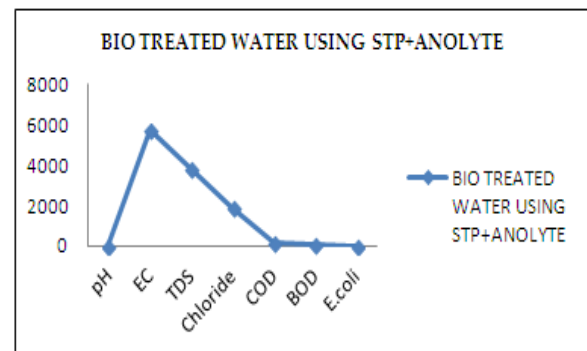


Figure: 15 Bio-Treated water using STP+Anolyte

Table: 2 Bio treated water using Bio clean STP

S.No	Parameters	Units	Result
1.	pH	mg/l	8.84
2.	EC	mg/l	5869.31
3.	TDS	mg/l	3870.00
4.	Chlorides	mg/l	1935.57
5.	COD	mg/l	560.00
6.	BOD	mg/l	138.00
7.	E.coli	p/a	Absent

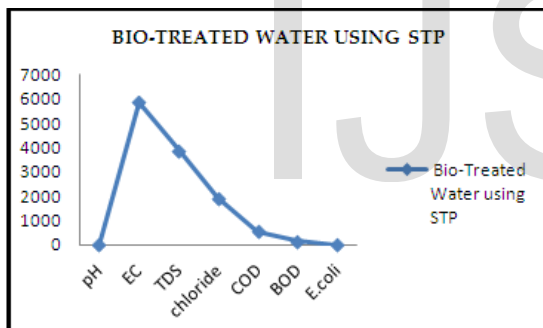


Figure: 16 Bio-Treated water using STP

Table: 3 Bio-Treated water using STP+Anolyte

S.No	Parameters	Units	Result
1.	pH	mg/l	9.42
2.	EC	mg/l	5718.00
3.	TDS	mg/l	3790.00
4.	Chlorides	mg/l	1925.64
5.	COD	mg/l	120.00
6.	BOD	mg/l	28.00
7.	E.Coli	p/a	Absent

4.1 Bioremediation

1. One time removal of water weeds.
2. Treatment of water spread area with microbial cultured powder or liquid or solid.
3. Waste water treatment before inlet point.
4. Regular maintenance of lake for one year to two years.
5. Reliable scientific method with holistic approach.
6. It is less expensive.
7. Bioremediation can often be carried out on site, often without causing
8. A major disruption of normal activities.
9. Instead of transferring contaminants from one environmental medium to another, for example, from land to water or air, the complete destruction of target pollutants is possible.

4.2 Effective Use of Water

1. Because of its high rate of development, Eichhorniacrassipes is an excellent source of biomass.
2. The plant is used as a carotene-rich table vegetable in Taiwan. Javanese sometimes cook and eat the green parts and inflorescence.
3. In Kedah (Java), the flowers are used for medicating the skin of horses.
4. In East Africa water hyacinths from Lake Victoria are used to make furniture, handbags and rope.
5. Also used as animal feed and organic fertilizer.

5 SCOPE FOR FUTURE WORK

- Bio Ozolyte Technology is attaining its scope in the domestic sewage treatment due to its flexibility, cost effectiveness and easy maintenance.
- No skilled laborers are necessary thus facilitating the employment possibilities.
- Effective use of this technology in Ooty Lake in Tamilnadu and in Hussain Sagar Lake in Hyderabad thus enabling the confidence to implement in future treatments.
- More advantageous than other conventional processes in regard with capital cost, maintenance, space requirements, power consumption etc.
- Possibilities of fisheries and recreational facilities.

- Instead of transferring contaminants from one environmental medium to another, for example, from land to water or air, the complete destruction of target pollutants is possible in bioremediation, which means that it is a onetime treatment for a period one to two years.
- Removal of water hyacinths may not become a waste of money, due to its various uses in various aspects such as biofuel, medicine, edible food, etc.
- Biofuel generation is an emerging trend which is a renewable.

6 CONCLUSION

The introduction of Bio clean powder shall improve the degradation activities. The introduction of Ozone shall further reduce the BOD, COD load and remove colour, odour and Bacterial load. The Anolyte mixing shall be for tertiary treatment and residual pollutant loads such as E.Coli and Bacterial loads are totally removed. The Anolyte treated water then sent through filter system. The Decentralized Bio-Ozolyte system has the capacity to the present polluted load. The results show that the new advanced system is simple and flexible and able to treat the waste water at Nanjarayan reservoir in Tirupur. The structural repair and remediation helps to hold more quantity of water to reduce impacts of the flooding and solve the water scarcity. If the quality of water is good for the assigned purposes, then only the lake water is useful to the society. The quality improvement activities will keep the lake water fresh and aquatic micro-organisms like zoo-plankton and phyto-plankton existence will help to keep the lake water fresh by nature itself.

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