

BiOWiSH® Aqua

Status Update: Lake Ranisagar Chaupati in Chhattisgarh, India after 3 Years without BiOWiSH

Background

In December 2015, BiOWiSH® Aqua achieved rapid bioremediation to significantly improve the water quality of Ranisagar Chaupati Lake over the course of an 8-week trial. Ranisagar Chaupati Lake was a highly eutrophic 2-hectare lake. The local government suggested Ranisagar Chaupati as a location to demonstrate BiOWiSH® Aqua’s capacity to improve water quality through an all-natural bioremediation protocol. The lake has an average water depth of 1.3 m and the main source of pollution is the discharge of domestic sewage and gray waters from surrounding open canals. During the trial period, the Rajnandgaon municipal corporation asked the National Environmental Engineering Research Institute (CSIR-NEERI) to act as an independent body to assess water quality changes in the lake. NEERI reported improvements across 12 water quality parameters as a result of BiOWiSH® Aqua bioremediation.

Unfortunately, the program was interrupted after only 3 months despite the positive results reported.

Three years later in May 2019, BiOWiSH and NEERI visited the site to check the lake’s water quality. Samples were collected and analyzed for various parameters to compare the level of pollution after 3 years without treatment in the lake.



Ranisagar Chaupati entrance

Implementation Plan (Year 2015 – 16):

An eight-week bioremediation protocol using BiOWiSH® Aqua was implemented starting December 28th, 2015. Before starting the study, all the pond’s inlets and outlets were closed, and floating aquatic plants and debris were removed.

BiOWiSH® Aqua



- Rapid nitrification and denitrification in aerobic and anaerobic conditions
- Reduces sludge production
- Increases plant treatment capacity
- Reduces odors
- Reduces aeration requirements
- Reduces need for chemical additives
- Improves plant stability
- Pre-treats influent in collection systems
- Natural and non-toxic

Available Sizes

- 100 g/3.5 oz
- 1 kg/2.2 lbs
- 5 kg/11 lbs
- 10 kg/22 lbs

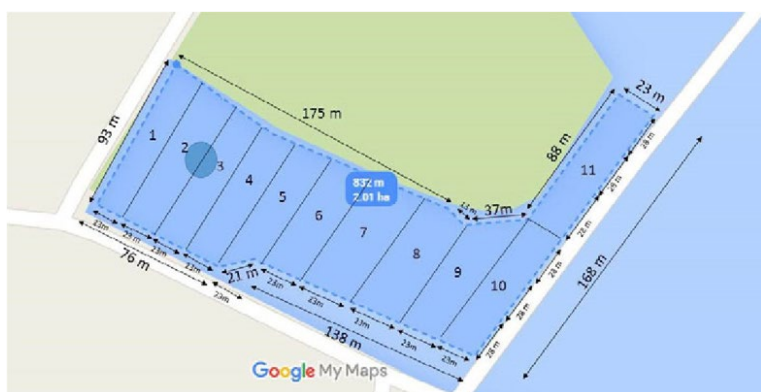


Satellite image showing the study area - Lake Ranisagar Chaupati, the park, surrounding lakes, and nearby communities

Date	Description
December 28 th	1 st dosing (Shock Dose)
January 7 th	2 nd dosing - Maintenance Dose
January 14 th	3 rd dosing - Maintenance Dose
January 21 st	4 th dosing - Maintenance Dose
February 4 th	5 th dosing - Maintenance Dose
February 11 th	6 th dosing - Maintenance Dose
February 18 th	7 th dosing - Maintenance Dose
February 25 th	8 th dosing - Maintenance Dose

Summary of dosing events

NEERI decided to divide the lake into 11 sections to facilitate dosing and sample tracking.



Lake divided into 11 sections



Team NEERI dosing BiOWiSH® Aqua in Lake Ranisagar Chaupati

An initial shock dose of 56 kg was sprayed on December 28th, 2015. Lower maintenance doses of 14 kg (aiming to maintain a 0.5 ppm activity for the calculated water volume) were added once a week.

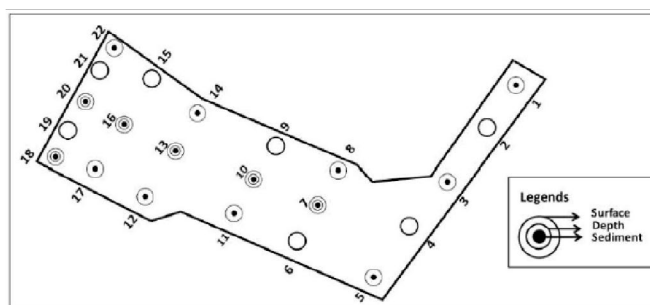
BiOWiSH® Aqua is a water-soluble powder and ships ready to dose. For each pond section, the required amount of product was dissolved in pond water and sprayed on the surface using a portable pump. The entire dosing event for the 2-ha pond took no longer than two hours each week.

Sampling (Year 2015 - 16):

NEERI played a major role in auditing the entire project. Since the bioremediation project for Ranisagar Chaupati Lake was approved by the State Government of Chhattisgarh, it was important that the sampling, chain of custody, and water quality analysis be done by a reputable GoI certified lab. NEERI's sampling protocol included 22 sampling locations distributed across the pond. Grab samples at multiple depths were collected from these locations on the dates shown in the table below:

Date	Description
December 13 th	1 st sampling before dosing
January 13 th	2 nd sampling
January 27 th	3 rd sampling
February 10 th	4 th sampling
February 24 th	5 th sampling

Summary of sampling events



Schematics of sampling location in Ranisagar Chaupati Lake

Results (Year 2015 - 16)

Parameters	Before Dosing (13 th Dec 2015)	After Dosing (24 th Feb 2016)	Observations	Remarks
pH	9.3	8.8	Decreased by 5%	Improved
Dissolved Oxygen	3.6	8.4	Increased by 133%	Improved
Chlorophyll a	0.30	0.18	Decreased by 40%	Improved
TKN (as N)	98.7	34.5	Decreased by 65%	Improved
Ammonia (as N)	9.8	5.9	Decreased by 40%	Improved
Nitrate (as NO ₃)	2.4	0.5	Decreased by 79%	Improved
Phosphate (as P)	1.0	0.6	Decreased by 40%	Improved
BOD (3d, 27°C)	35	25	Decreased by 29%	Improved
Sediment Organics (%)	8.7	2.4	Decreased by 72%	Improved
Phytoplankton (Density/L)	7.7 x 10 ⁶	6.1 x 10 ⁶	Decreased by 21%	Improved
Palmer's Pollution Index (PPI)	19	10	Decreased by 47%	Improved
Zooplankton (Density/L)	81333	81	Decreased by 99.9%	Improved

Effect of bioaugmentation with BiOWiSH® Aqua on several parameters before and after dosing

Results Comparison (Years 2016 & 2019)

Parameters	Treatment with BiOWiSH® (24 th Feb 2016)	After 3 years without any treatment (31 st May 2019)	% Change
BOD	25.1	166.5	563
COD	129.1	367.75	185
Ammonia (as N)	5.93	3.28	-45
TKN (as N)	63.91	204.75	220
Nitrate (as N)	0.46	0.52	11
Suspended Solids	86.45	94	9
Phosphate (as P)	0.62	9.81	1491
TDS	453.45	772	70
pH	8.830	9.32	5



Present condition of Lake Ranisagar Chaupati water (May 2019)

Discussion

The study shows the difference in the water quality of Lake Ranisagar Chaupati several years after discontinuing BiOWiSH® Aqua treatment. This highlights the importance of continuing a long-term bioremediation program with BiOWiSH® Aqua to sustain the improvements in water quality.

The BiOWiSH team, along with their local partner in India, InNow India Pvt Ltd, continue their journey to identify such polluted water bodies in India and offer cost-effective bioremediation programs.



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