

Project on Revival of Polluted Ghosale Lake in Thane

**Final Report December-2008
Prepared by**



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Pollution Control Cell

**Submitted to
MMR Environment Improvement
Society
Bandra(E)**

Introduction

Ghosale Lake is one of the important lake in Thane Municipal Corporation area. It is situated at mid of Thane city, near major traffic junction with high density development around it. The lake was known for its floating hotel Abhiruchi that was situated in the middle of lake. Residential colonies & open spaces form the immediate surroundings of lake. There is a one major green open space with planned plantation on east side of the lake.

The storm water from the road which contains lots of grease oil & waste directly enters the lake .There was absence of municipal nalla at the Marksnagar area which encourages people to divert their waste water in lake area. The garbage from nearby area i.e. Bapuji Nagar & Marks nagar directly enters the lake.

Initially in year 2002 TMC has floated tender for lake cleaning but due to court case of floating structure, cleaning operation was withheld. It was observed that due to highly polluted water, there was possibility of spreading of epidemic diseases .In view of this TMC has decided that lake cleaning will be carried out with help of bioremediation technology which will not disturb the middle structure.

Thane Municipal Corporation constructed a storm water drainage line & boundary wall in year 2004-2005 to avoid ingress of wastewater garbage in lake. As bioremediation process was started in year 2003, due to physical cleaning & application of aeration system, structure started collapsing, due to soil loosening .As this structure collapse in water there would be heavy ionic impurity in water which further damages ecosystem of lake, hence TMC has approached Hon High court for permission to remove the said structure in larger interest of public &ecosystem of lake.

Hon. High Court has passed the order dt 12.04.2006 to remove the floating skeleton, hence pollution control cell of TMC had with held the process of addition of bioproduct in lake. The hotel was built up of heavy steel structure which was corroded. It was installed on 21 air tanks of size 6m*3m*4m.Out of 21 air tanks 12 were completely filled with water & rooted in the sludge. Hence such a tremendous job has taken lot of time & work was completed in March 2008.After that fourth dose of bio product is added & water quality has shown improvement.

TMC is also planning for Beautification of this lake which will conserve the aesthetic beauty & its surroundings.

Funding Pattern:-

As this Bioremediation technique was new & highly technical Thane Municipal Corporation has submitted this proposal to MMR Environment Improvement Society for sanctioning & contribution per agency was as follows:

Agency	Contribution in Rs
Thane Municipal Corporation	9,35,120/-
MMR EIS	6,00,000/-
Total Cost	15,35,120/-

Scope of work of the agency was as follows:

- Baseline data collection & continuous monitoring of Ghosale Lake.
 - Physical Cleaning of lake water & proper disposal of this waste.
 - Installation of Aeration system
 - Addition of bio products.
- Establishment of Analytical Schedule with TMC & submission of progress report.

Objective

- DO level 4 ppm or more at top & 3 ppm or more at bottom of water body in day time & even in night time there should not be any anaerobic stage.
- Reduction of organic sludge to sufficient low level so as to prevent any eutrophication & leaching of pollutant in water body.
- To achieve on average following parameters in water body.

Parameters	Limits
COD	10-30 mg/l
TSS	10 mg/l or less
Total Phosphates	0.01 to 0.035 mg/l
Clarity	100 cm or more

Action Plan

TMC has started conservation of Ghosale lake by Bio remediation process Work order was issued to the contractor M/S A.C.E. Housing & Construction in July 2003

- **Physical Cleaning of lake**

Physical cleaning was manually done which included removing of floating water hyacinth & other weeds along with work was also taken up by contractor for removing of unwanted floating material from water body & cleaning of surrounding area.

- **Installation of Aeration System**

Aeration system is necessary to maintain 3 ppm dissolved oxygen level at bottom in lake .Aeration system installed is continuous laminar air flow inversion & oxygenation system .It is diffused aeration system where diffusers are placed at the bottom of the lake. The compressor that pumps air into these diffusers are placed on the bank of lake. Diffusers are vibrating micro porous membrane diffusers, which slowly churns the water levels & slowly mix oxygen from the air in to the lake.

Aeration system installed in month of Sep 2003 & is diffuser type.It consists of one 5 HP motor with 16 diffusers.

- **Addition of Bio Products**

Bio products used are of clean flow cleaner special for removal of phosphates & limiting algal growth. Bio products are pre – adopted microorganisms encapsulated in nutrients acting according to biological process. Each gram should have at least 10^{10} organism.

Bio product addition

First Dose	Dec. 2003	- 500 Kg
Second Dose	Dec. 2004	-300 Kg
Third Dose	Dec. 2006	-300 Kg
Fourth Dose	April 2008	-300Kg

Construction of wall

TMC has erected eight feet wall around the lake periphery in year 2004-2005 which prohibits throwing of garbage in lake by slum dwellers residency in vicinity of lake.

Diversion of Drainage line

Thane Municipal Corporation has constructed close RCC nallah of cost Rs.17 Lakhs near lake which prevents ingress of waste water in lake in year 2004-2005

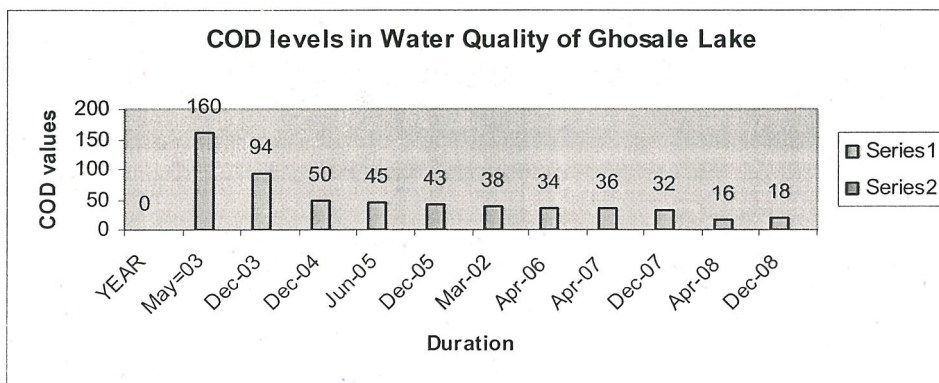
Water Quality of Ghosale Lake:-

Parameters	Values in May 03 (Before Bio Remediation)	Values in Dec 03 (After inst of Aeration System & Application first dose of bio product)	Values in Dec 04 (After Continuous Running of Aeration system & Application of second dose of bio product)	Values in June 05	Values in Dec. 05	Values in March 06	Values in Dec 06 (After Continuous Running of Aeration system & Application of second dose of bio product)	Values in April 07	Values in Dec. 07	Values in April 08 (After removal of floating Iron structure & Addition of bio Product)	Values in Dec. 08	Values for Eco Maintenance
Water Analysis												
Sur DO	mil	3.6	4.9	8.0	5.5	5.8	6.2	6.6	6.2	6.6	6.8	-
COD	160	94	50	45	43	38	34	36	32.75	16	18	10-30
BOD	60	33	40	21	22	16	14	13	15.37	8	8	--
PO4	17	0.3	0.4	0.58	0.114	0.109	0.088	0.073	0.09	0.023	0.012	0.01
Nitrates	6.3	0.9	0.8	0.31	0.139	0.123	0.113	0.11	0.17	0.082	0.09	0.1
SS(mg/L)	60	35	60	50	41	37	30	13	15	8	12	10
Chlorophylla (mg m ³)	251	159	351	91	37	33	31	Traces	Traces	Traces	Traces	8-25
Sludge Analysis												
COD	4.8	1.9	2.1	2.05	2.4	2.3	2.1	2.6	2.5	2.3	-	2.4
% Organic Matter	63	32	42	37	15	15.7	15.3	14.9	13.8	12.7	-	12
Nitrate (gm/Kg)	6.3	0.17	0.23	2.4	0.104	0.101	0.09	0.023	0.024	0.013	-	0.014
Phosphates (gm kg)	10	2.5	2.8	2.78	0.025	0.031	0.028	0.033	0.023	0.034	-	0.04

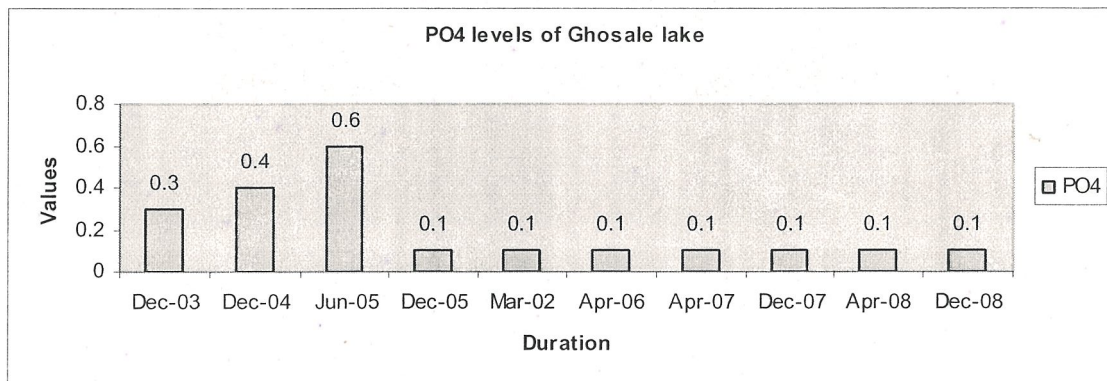
Remarks :- Due to continuous aeration activities, diversion of nalla water construction of periphery wall ,proper O & M the lake water quality is improved as comparison with values for eco maintenance.

Graphical Representation of water quality data

YEAR	COD mg/l
May=03	160
Dec-03	94
Dec-04	50
Jun-05	45
Dec-05	43
Mar-02	38
Apr-06	34
Apr-07	36
Dec-07	32
Apr-08	16
Dec-08	18

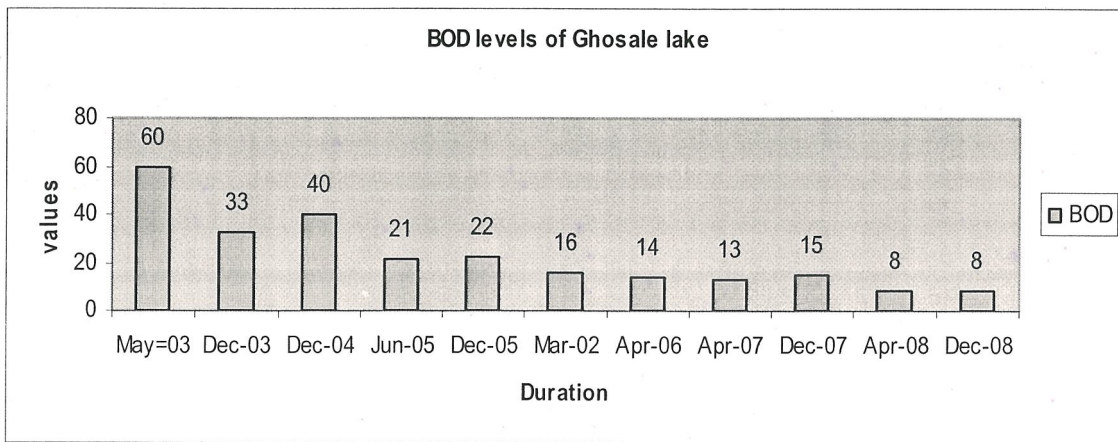


YEAR	PO4 mg/l
Dec-03	0.3
Dec-04	0.4
Jun-05	0.6
Dec-05	0.1
Mar-02	0.1
Apr-06	0.1
Apr-07	0.1
Dec-07	0.1
Apr-08	0.1
Dec-08	0.1

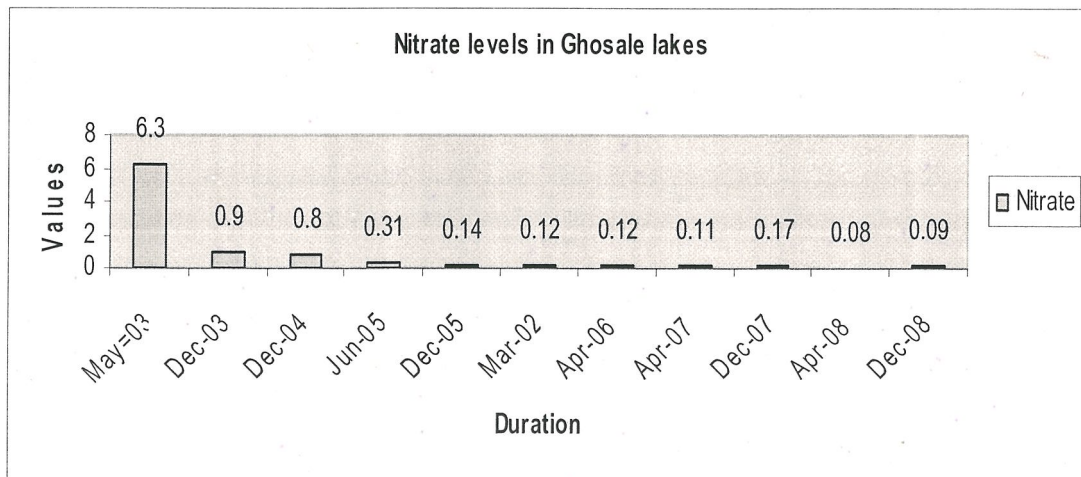


Graphical Representation of water quality data

YEAR	BODmg/l
May=03	60
Dec-03	33
Dec-04	40
Jun-05	21
Dec-05	22
Mar-02	16
Apr-06	14
Apr-07	13
Dec-07	15
Apr-08	8
Dec-08	8

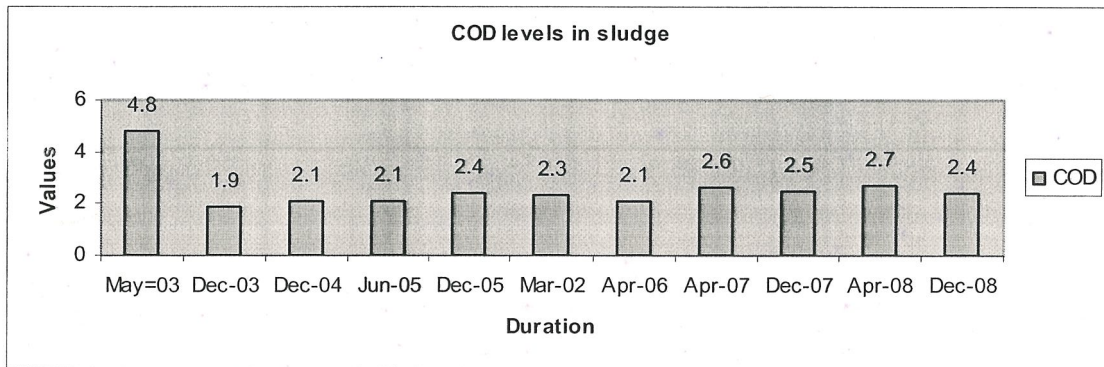


YEAR	Nitrate mg/l
May=03	6.3
Dec-03	0.9
Dec-04	0.8
Jun-05	0.31
Dec-05	0.14
Mar-02	0.12
Apr-06	0.12
Apr-07	0.11
Dec-07	0.17
Apr-08	0.08
Dec-08	0.09

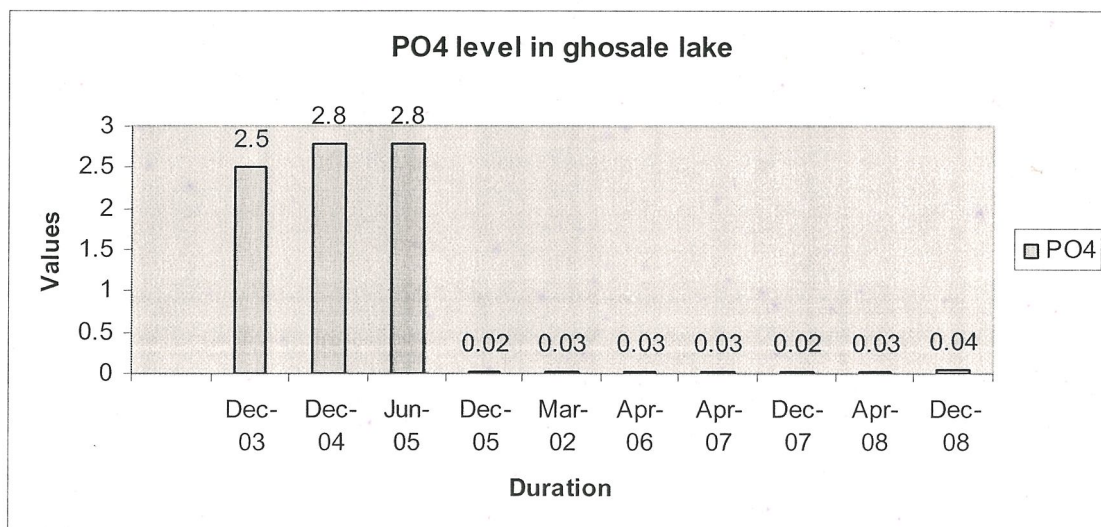


Graphical Representation of Sludge Quality of Ghosale lake

YEAR	CODgm/kg
May=03	4.8
Dec-03	1.9
Dec-04	2.1
Jun-05	2.1
Dec-05	2.4
Mar-02	2.3
Apr-06	2.1
Apr-07	2.6
Dec-07	2.5
Apr-08	2.7
Dec-08	2.4



YEAR	PO4gm/kg
Dec-03	2.5
Dec-04	2.8
Jun-05	2.8
Dec-05	0.02
Mar-02	0.03
Apr-06	0.03
Apr-07	0.03
Dec-07	0.02
Apr-08	0.03
Dec-08	0.04



Before Revival of Ghosale lake.



Before Removal of Iron Structure:-



After Removal of structure:-



Removal of floating Structure



OPERATION AND MAINTAINANCE OF LAKE

