

Presentation from the
**Workshop on
Innovations for Scaling up to
Citywide Sanitation**

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PHYTORID
Other Sewage
Technology for
Treatment Options
Sewage Treatment



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At Center of India: Nagpur

Institute

- CSIR Laboratory
- HQ Nagpur, 5 Zonal Labs
- 150 Scientist
- 300 Project Fellows
- 300 other technical & supporting staff
- Annual Budget of Rs. 240 Millions
- ECF 50 %
- R&D Thrust Areas
 - Environmental Monitoring
 - Environmental Modeling
 - Environmental Materials
 - Environmental Biotechnology & Genomics
 - Environmental System Design and Optimization
 - Environmental Impact & Risk Assessment
 - Environmental Policy
- Advisory
 - Industries
 - Central Govt. Ministries/Boards
 - State Govt. Ministries/Boards
 - Judiciary

Urban Waste Water Management

Sources

- Municipal/domestic waste water
- Storm water discharges
- Hotel and Offices
- Agricultural runoff
- Landfill leachates
- Industrial wastewater

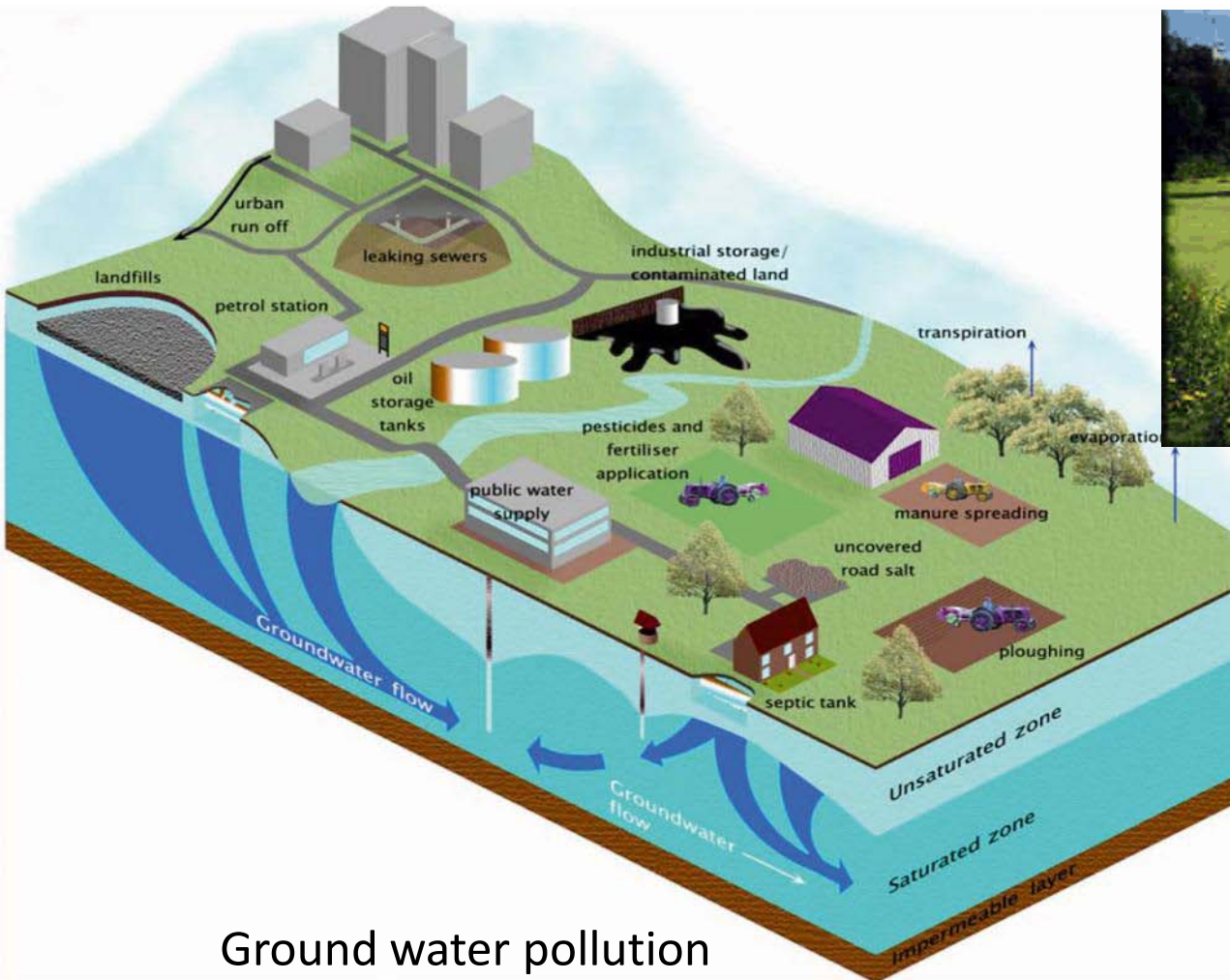
Impact

- Ground water pollution
- Eutrophication of lakes and other water bodies
- Degradation of river water quality
- Impact on public health

Treatment

- Reuse/recycle
- Avoiding contaminations in water bodies
- Decentralized approach for reducing pressure on civic bodies

Impact



Ground water pollution

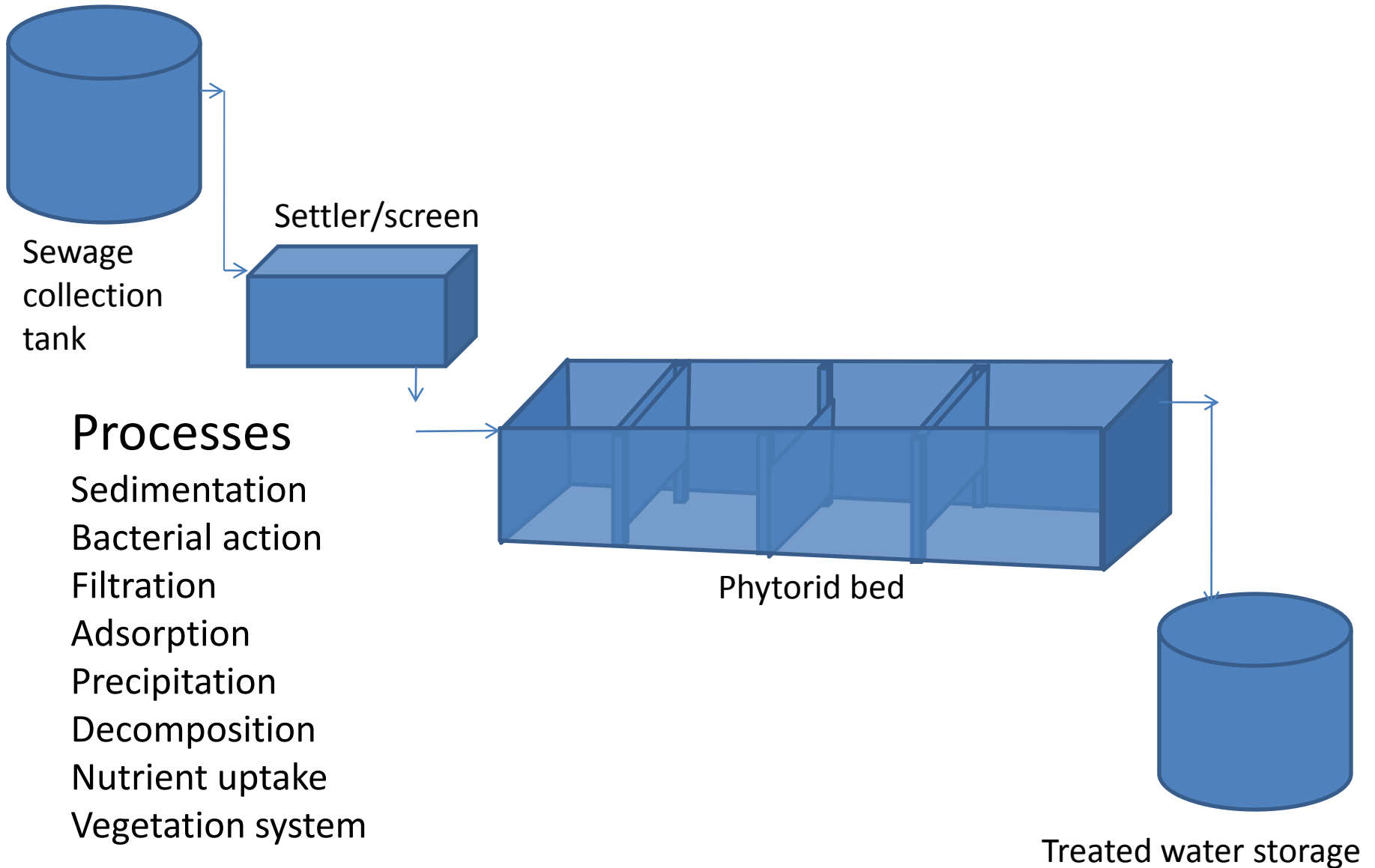


Eutrophication in lakes and other water bodies

Impact on public health

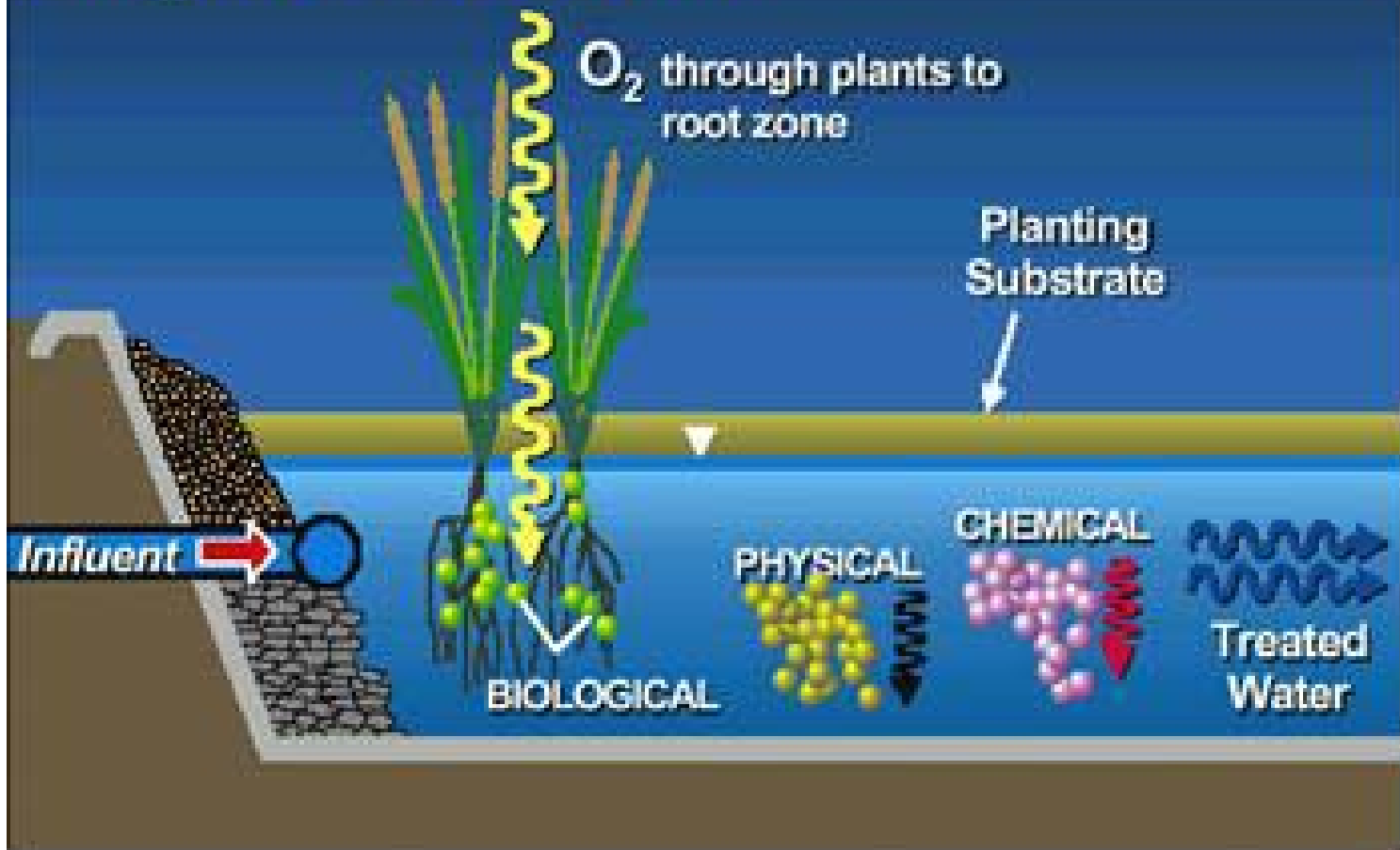
- Odor problems
- Mosquito nuisance and breeding of insects
- E-coli and other pathogenic micro-organisms can contaminate drinking water sources
- Spreading of communicable diseases like cholera, dengue, malaria, etc
- Impact on bathing quality of rivers, beaches etc.

Components of PHYTORID system

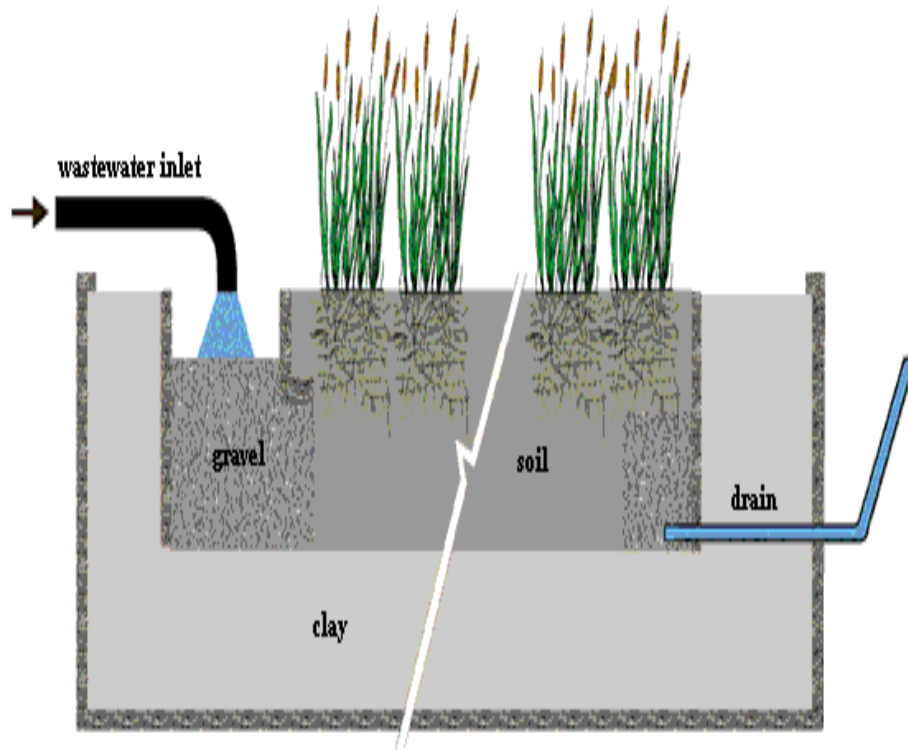


Phytotrid Details

Contaminant Removal Mechanisms: *Multiple Processes At Work*



Subsurface Flow System

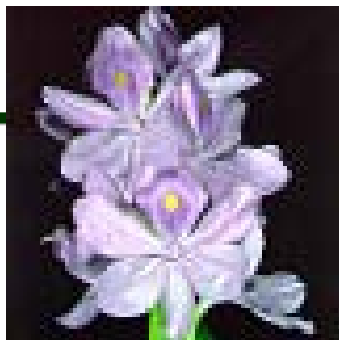


- **Reduced odour – no wastewater at surface**
- **Propagation of insects is also controlled**
- **Microbes that treat the wastewater live on the gravel, soil and plant surfaces**
- **plants provide oxygen and food for the microbes**

Typical Performance Characteristics for Various Treatment Methods

Sr.	Items	Conventional activated sludge	UASB	Extended Aeration	Facultative Aerated Lagoons	PhytoRid Technology
1	Performance BOD Removal %	85-92	75-78	95-98	75-85	80-95
2.	Sludge	First digest then dry on beds or use mech devices	Directly dry on beds or use mech devices	No digestion dry on sand beds or use mech devices	Mech. Desludging once in 5-10 years	Negligible
3.	Equipment Requirement (excluding screening and grit removal common to all processes)	Aerators, recycle pumps, scrappers, thickeners, digesters, dryers gas equipment	Nil except gas collection and flaring gas conversion to elect is optional	Aerations, recycle pumps sludge, scrappers for large settlers	Aerators only	None, all flows by gravity
4.	Operational Characteristics	Skilled operation reqd.	Simpler than ASP	Simpler than ASP	Simple	Unskilled operator
5.	Special features	Considerable equipment and skilled operation reqd specially when gas collection and usage considered	Minimal to negligible power reqd. makes it economical at even if gas revenue is neglected	BOD removal highest effluent nitrified high power reqd. Favoured for small and medium plants	Power reqd. similar to ASP operation simpler	Plant species and odour less operations

Various Plant Types



Water Hyacinths *Eichhornia crassipes*

Forage Kochia *Kochia spp*

Poplar Trees *Populus spp*

Willow Trees *Salix spp*

Alfalfa *Medicago sativa*

Cattail *Typha latifolia*

Coontail *Ceratophyllum demersum L*

Bullrush *Scirpus spp*

Reed *Phragmites spp.*

American pondweed *Potamogeton nodosus*

Common Arrowhead *Sagittaria latifolia*



ADVANTAGES

- Cost-effective
- Operation and maintenance expenses are negligible.
- Minimum electricity requirement
- Smaller footprint (Retention time: Typically less than 24 hrs.)
- Facilitates recycle and reuse of water
- No foul odor and No Mosquito Nuisance.
- Tolerates fluctuations in operating conditions such as flow, temperature and pH

APPLICATION

PHYTORID system is useful for treatment of waste water in following applications

- **Domestic wastewater (including decentralized Municipal waste water treatment)**
 - **Colonies, Airports, Commercial complexes, Hotels**
 - **Open drainage**
 - **Cleaning of nallah water**
- **Agricultural wastewater**
- **Dairy waste**
- **Slaughter House Waste**
- **Fish pond discharges**
- **Pre treated industrial wastewater**
- **Municipal Landfill leachates**
- **Several other applications**

Applications in the field

- Flexible design it can be implemented at any soil strata, water levels etc.



Phytotrid on Hard Rock: Above
Ground Level



Phytotrid on Soft Soil: Below
Ground Level, also on slope

PRODUCT WATER QUALITY

- Treated water complies to the regulations laid down by MPCB/CPCB (Table IV fresh water category) to reuse the water for the purpose of discharge, gardening agriculture etc.



GREEN POINTS

- Best Adoptable technology for in-situ treatment and reuse of waste water
- Phytorid Technology carryout on-site treatment and reuse of grey water up to 95%, which would attract total of 5 credits on Indian Green Building Certification (IGBC).

AESTHETICS



Performance of PHYTORID for urban waste

Pollutant	Performance (% removal)
Total suspended solids	75 – 95
Biochemical oxygen demand	80 – 95
Chemical oxygen demand	80 – 90
Total nitrogen	80 – 95
Phosphate	60 – 80
Fecal coliform	85 – 95

Treated water quality will meet the specified norms of CPCB/MPCB for water reuse

Design for a typical lake



Nalla and Treatment Scheme

- Floating matters removal
- No treatment in terms of TSS, BOD, N, P, FC and TC
- **Only banking done**
- Plant species were placed on the soil near the periphery



Advantages of Phytotrid

- Works on gravity
- No electric power requirement
- Scalable technology
- Easy to maintain
- Adds to aesthetics
- Cost effective



Deatials of PHYTORID facilities case studies

NEERI



Inaugurated by
Shri Suresh Shetty

(Honbl'e State Minister)
Medical Education Higher & Technical Education

On

World Environment Day
5th June, 2006

at

Kalina Campus, Mumbai University

Till

World Environment Day
5th June, 2012

More than 20 plants



Case Studies (Contd..)

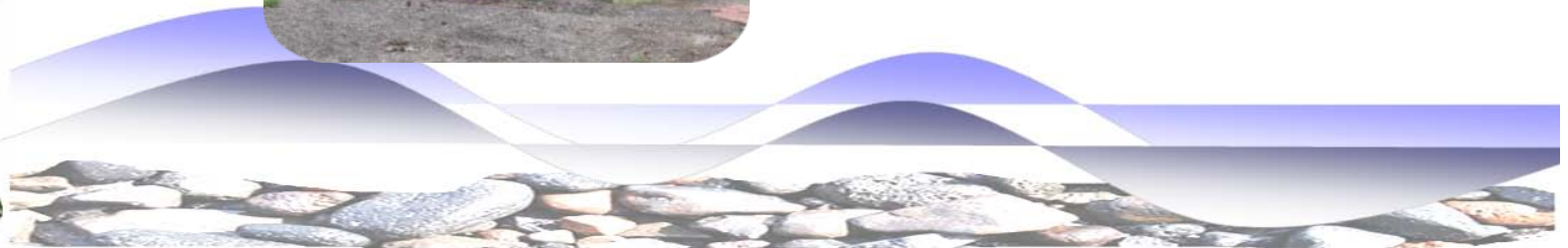
MUMBAI UNIVERSITY CAMPUS **(KALINA-MUMBAI)**

- ✿ Design for treatment of mixed (sewage – laboratory) wastewater generated from various department
- ✿ Design to treat the flow of 50 CMD
- ✿ Operation starts from June 2006
- ✿ Treatment system has primary chamber, secondary advance system and Phytoid system
- ✿ Treated water is reuse for gardens and in lake within the campus



KOLIMB AGRICULTURAL COLLEGE **(TITWALA-THANE DIST.)**

- ✚ Design for treat the grey wastewater generated
- ✚ Design to treat the flow of 5 CMD
- ✚ Operation starts from June 2009
- ✚ Treatment system has septic chamber and Phytoid system
- ✚ Treated water is reuse for gardens, vermin-compost plant



Case Studies (Contd..)

MATHERAN HILL STATION (ANAND RIDTZS-ALIBAUG DIST.)

- ➔ Design to treat the flow of 20 CMD
- ➔ Design for treat the sewage generated from the hotel
- ➔ Operation starts from Oct 2010
- ➔ Treatment system has septic chamber and Phytorid system
- ➔ Treated water is reuse for gardens and lawns



SIEMENS FACTORY (KALWA, THANA)

- ✓ Design for treat the sewage generated from the factory
- ✓ Design to treat the flow of 500 CMD
- ✓ Operation starts from Aug 2007
- ✓ Design of the treatment plant was done to protect existing green cover/ plants
- ✓ Treated water is reuse for gardens and lawn



PREMIER AUTO LTD (PIMPRI CHINCWAD)

- ✓ Design for treat the sewage generated within the factory
- ✓ Design to treat the flow of 150 CMD
- ✓ Operation starts from Jan 2007
- ✓ Treatment system has primary treatment system and Phytorid system
- ✓ Treated water is reuse for gardens and lawns



Case Studies (Contd..)

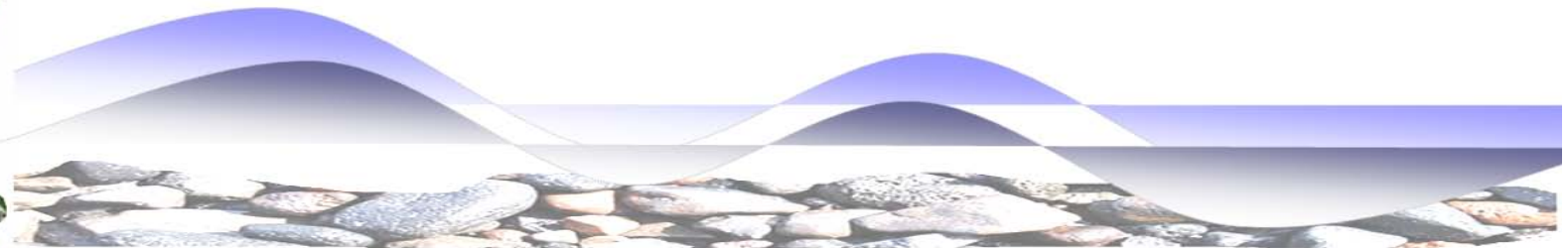
MAHINDRA & MAHINDRA LTD. (IGATPURI, DIST. NASHIK)

- Design for treat the sewage generated from the factory premises
- Design to treat the flow of 60 CMD (2 STP's)
- Operation starts from July 2007
- Treatment system has Primary Treatment System and Phytorid system
- Treated water is reuse for gardens within the premises



BHARAT FORGE LIMITED (BARAMATI)

- ✚ Design for treat the sewage generated within the premises
- ✚ Design to treat the flow of 100 CMD
- ✚ Operation starts from July 2009
- ✚ Treatment system has septic chamber and Phytorid system
- ✚ Treated water is reuse for gardens and lawns



Case Studies (Contd..)

Warana Industries Ltd (Warananagar, Dist: Kolhapur)

- ↗ Design for treat the sewage generated within the premises
- ↗ Design to treat the flow of 10 CMD
- ↗ Operation starts from Oct 2008
- ↗ Treatment system has primary treatment system and Phytorid system
- ↗ Treated water is reuse for gardens and floor washing



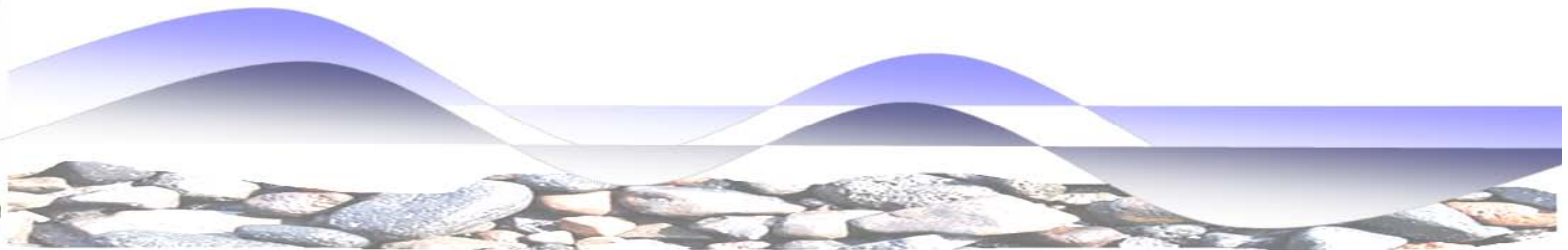
AJAY METACHEM PVT. LTD. (WADKI, PUNE)

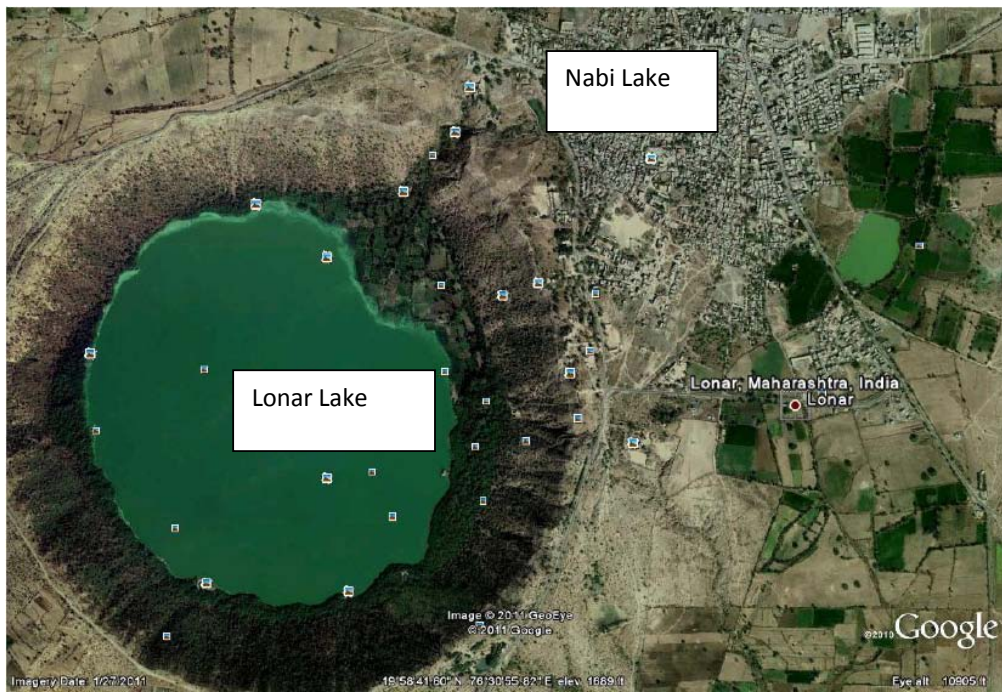
- Design for treat the sewage generated from the hotel
- Design to treat the flow of 2 CMD
- Operation starts from Jan 2008
- Treatment system has primary and tertiary treatment with Phytorid system
- Treated water is reuse for gardens



Projects Under Implementation

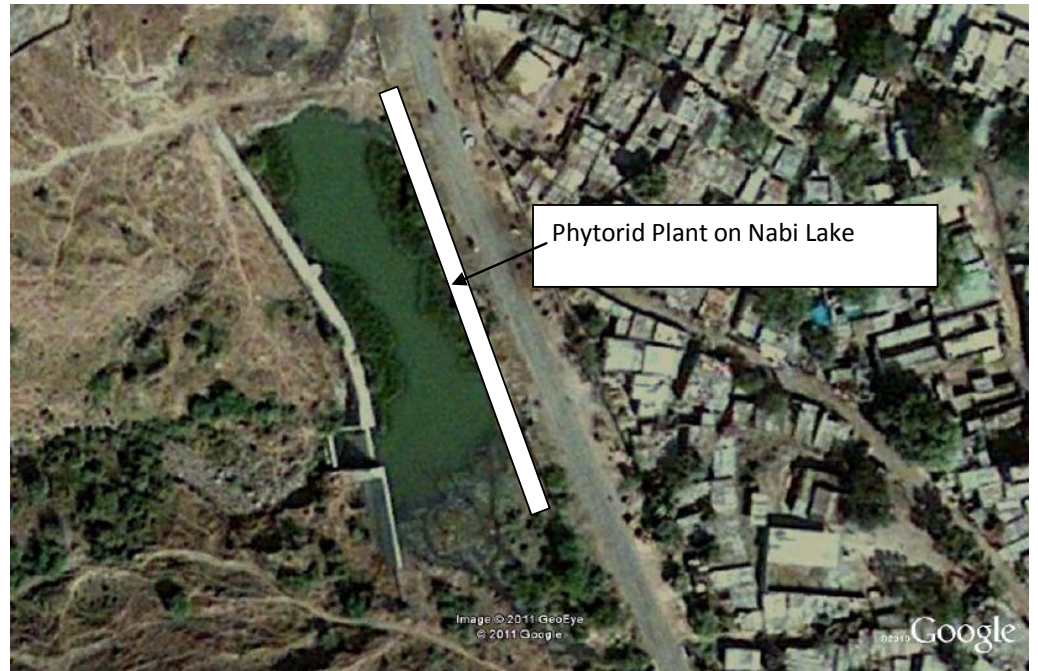
- ✓ Raj Bhawan, Mumbai
- ✓ Ammunition Factory, Khadki, Pune
- ✓ Greater Noida, Noida
- ✓ Raipur Development Authority, Raipur
- ✓ Bhillai Corporation, Bhillai
- ✓ Maharajbagh Garden, PDKV, Nagpur
- ✓ Slaughter House, Kamptee
- ✓ Phalton Municipal Council, Phalton
- ✓ Teen Murti Bhavan, New Delhi





Under Consideration

Lonar Lake, Maharashtra



Thank You