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**The Principal Secretary/Secretary
PHED/Rural Sanitation Department
ALL STATES/UTs**

**Technologies based on no-power requirement for
maximizing recycle and reuse of wastewater**

Sir,

I am directed to forward technologies proposed by NEERI Nagpur which are based on no-power requirement for maximizing recycle and reuse of wastewater for use in gardens in rural areas.

2. I am, therefore, enclosing a copy of NEERI's Natural System Based PHYTORID Technology for Sewage Treatment. You may kindly like to examine its applicability in rural areas. Initially this could be started on pilot basis and later on up scaled if found suitable. Regarding costing, technological viability, sustainability and the protocol requirements, may kindly be obtained from NEERI, Nagpur.

Yours faithfully,

Encl: as above


(Sujoy Mojumdar)
Director (Sanitation)

Natural System Based PHYTORID Technology for Sewage Treatment (Changing Sewage to irrigation water)

National Environmental Engineering Research Institute, CSIR,
Nehru Marg, Nagpur 440020

PHYTORID is a subsurface mixed flow constructed wetland system (SSFCW) developed and internationally patented by National Environmental Engineering Research Institute (NEERI) Nagpur with successful demonstration in the field for more than 8 years of continuous operation as a stand alone sewage treatment system. The PHYTORID systems based on natural treatment methods have distinct advantages over conventional treatment plants. The technology is recommended for decentralized plants with varying capacities of 50 m³/day to 8-10 MLD.

Advantages of the Phytoid technology

- **No mechanical or electrical machineries** such as aerators/pumps are involved therefore very low maintenance (about 10% of Activated Sludge treatment plant or even less as compared to Membrane technology).
- **Space saving** technology as compared to other no-electricity (passive) systems such as Wastewater Stabilization Ponds (WSP). One day residence time for Phytoid as compared to 10-18 days for WSP
- **Scalable** from individual household to community to village/township level
- Decentralized system thereby saving cost on sewage pipelines and avoids loss by leakages
- Treated water quality meets discharge and irrigation standards specified by CPCB. If ozonation (based on solar power) is added then it meets all reuse standards.
- Aesthetic improvements as Phytoid resembles garden (Photo shown below)
- Due to subsurface flow design, no mosquitoes and odor nuisance as compared to some other surface flow technologies

Applications

- Municipal sewage treatment (grampanchayat/council/corporations)
- Nallah water treatment
- Conservation of water bodies by avoiding wastewater disposal
- Commercial or public utility spaces (airports, railway stations, complexes)

Environmental Policy 2005 (MoEF)

Environmental Policy 2005 recommends decentralized systems based on constructed wetlands. Phytorid is a constructed wetland technology patented by CSIR-NEERI.

Typical Pollutant Removal Efficiencies of Phytorid

Pollutant	Performance (% removal)
Total suspended solids	75 – 95
Biochemical oxygen demand	90 – 95
Chemical oxygen demand	85 – 90
Total nitrogen	70 – 90
Phosphate	70 – 80
Fecal coliform	95 – 99



Phytorid Technology in use:

- More than 35 plants already working (Maharashtra, Goa, UP, Uttarakhand, Delhi)
- Under construction about 15 plants
- In active consideration more than 100

Proposal and request:

- In order to achieve sanitation (domestic sewage treatment) goals and improve availability of water for irrigation concomitantly, Phytorid to be implemented in all rural and semi-urban areas (small towns)

- If a capital cost is made available in budgets to ULBs Phytoid is sustainable for about 25 years of operation with low O&M and no repairs.
- Request to give priority to domestic sewage treatment at all levels over usual developmental work expenditure i.e. buildings, cultural centers and roads etc.

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