

Technology

Treating sugar mill effluent in hybrid model of vertical and horizontal flow Constructed Wetland and utilizing in an Integrated Aqua-Agro Farming system (IAAF)

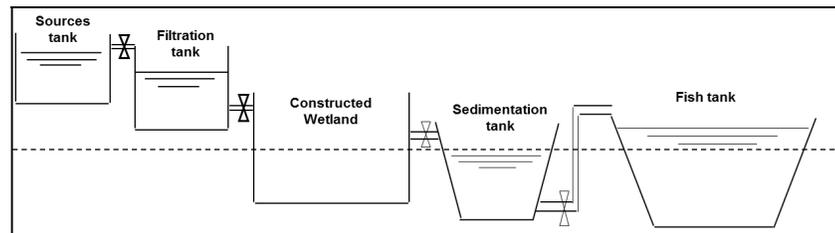
Research organization



The M. S. Swaminathan Research Foundation (MSSRF) is a leader in the field of food and agriculture among non-governmental research organizations in India. MSSRF's vision is to harness science and technology for sustainable and equitable development.

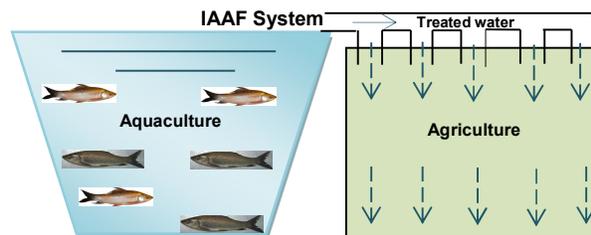
Description of the technology being developed

The treatment system comprises of a filtration tank followed by constructed wetland (CWL), sedimentation tank, and finally a fish tank. Schematic diagram of treatment system is given below:



The coarse particles from the sugar mill effluent are removed in the filtration tank, which reduces the clogging of wetland system. CWL encompasses five chambers filled with varied substrates and hybridized vertical and horizontal flow of water in alternate chambers. Effluent from CWL is stored in the sedimentation tank and used for culturing fish seed without feed. *Typha angustifolia*, an emergent macrophyte associated with floating macrophytes like duckweed, *Wolffia arrhiza* and consortia of algae in CWL effectively contributes to enhancement of water quality by up-taking the contaminants and pumping in oxygen, making it suitable for fish culture and agriculture.

The lipids, protein and polysaccharides of algal consortia (*Spirogyra* sp., *Phormidium* sp., *Chroococcus* sp., *Cladospora* sp., *Nitzschia amphibian*, *Achnanthes subhudsonis* var. *karaeuselii*, *Achnantheidium exiguum*, *Amphora* sp., *Anabenna* sp., *Gomphopaeria* sp., *Chlorococcum* sp.) help in the removal of organic and inorganic contaminants by adsorption and sedimentation which decrease the COD, BOD, phosphate, sulphate, etc.



The fish tank is considered as a tertiary treatment process which reduces COD, BOD, TSS, and TDS to a considerable amount. The nitrogenous waste from aqua pond is reused as nitrogen source for crop cultivation.

Benefits	<ul style="list-style-type: none"> • Substantial removal of organic and inorganic contaminants including COD, BOD, phosphate, sulphate, nitrate, etc. • Increased farm productivity and profitability without any net increase in water consumption • Aquaculture adds nutrients in organic form which contributes for fertilizer savings in agriculture. • Income from both aquaculture and agriculture production systems • Reduced health impacts on human and livestock due to enhanced water quality
Financial viability	<ul style="list-style-type: none"> • The CWL is a green technology for treating SE requiring low energy, simple construction with locally available materials and skills, less maintenance, user and environment friendly. • It is highly adaptable and deployable at small/large scale as per needs. • Combination of treatment and reuse technologies increases water availability and agricultural productivity in an eco-friendly manner with significant cost savings, multiple benefits like minimizing harmful effects on land, water, human and livestock health.
Potential users	Sugar industries, aquaculture and agriculture farmers, government institutions
Contact person	Dr. J. D. Sophia Principal Scientist, Coastal Systems Research, MS Swaminathan Research Foundation (MSSRF) Chennai, India Tel: 91-044-22541229 Email: sophia@mssrf.res.in