



Enhancing common effluent treatment with a reedbed system

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Since the introduction of reedbeds to India in 1997 for secondary and tertiary tannery effluent treatment⁽¹⁾, the technology has been under investigation at Ranipet. Whereas Phragmites and Typha have become the prime reed species in most situations, it was found that Sp. Trema was most suited to the effluent characteristics at this site. Accordingly, a number of pilot reedbeds have been set up and investigated for both secondary and tertiary treatment, and managed for long periods of time.

Common effluent treatment at Ranipet

Ranipet is a Common Effluent Treatment Plant (CETP) treating approximately 1,700 m³/day (*design capacity 4,000 m³/d*) of effluent received from 76 tanneries mainly processing from the raw to finished state. It has been in continuous operation for 10 years and is recognised as a model system in terms of quality of treatment and site management.

The mode of treatment is basically conventional, that is screening, balancing, chemical dosing/primary clarification, biological treatment/secondary clarification, tertiary dosing/settling, and finally filtration with sand and activated carbon filters. However, for many years an additional treatment was applied after primary clarification. This comprised of a 10-day anaerobic retention in a holding tank of 3m depth, which reduced the strength of the feed to activated sludge treatment from a COD/BOD of 1350/800 mg/l by approximately 20%.

Due to difficulties with sludge removal and severe odour and corrosion problems, it was eventually decided to discontinue this stage. After pumping the effluent from the holding tank, the sludge was left to fully dry out in the containment vessel.

The win-win situation

After the sludge had become fully dried a reedbed installation was seen to offer considerable advantage:

- There was no need to remove and dispose of the dried sludge. After leveling and compacting, the whole area could be covered with 0.3 m of impermeable clay as the base for a new reed bed. The reedbed would then be established on the sealed solid waste held within the watertight containment vessel.
- The medium to support the reeds was available locally as

stable sand of 3–4 mm size. Both the medium and the reed species were proven, and there was a source of reeds on-site for transplant.

- The reeds are known to withstand the strength and salinity of the chemically dosed effluent.
- With a retention time of 1 day, it is estimated that the effluent strength will be reduced by 50% before delivery to activated sludge treatment. This will reduce the power demands of the activated sludge treatment system by an estimated equivalent of \$25,000/annum.

A new concept

Reedbeds have been found effective as an alternative for secondary and tertiary effluent treatment, nevertheless, this application is different. The intention is not for a long retention and full treatment, but to substantially reduce an effluent load before conventional secondary treatment.

The setting-down of the clay layer began in February 2006, and it is intended to have the plant fully commissioned by May 2007. But there are other aspects that should be taken into account. Situated in the centre of this major effluent treatment plant, the quality of the whole site will be improved. The creation of a fresh green area of 7,800 m² that supports insects, butterflies and birds will introduce a new and exciting concept to effluent management.

Additional information

(1) *Reedbed applications for tannery effluents was first investigated by R Daniels in 1995. Funded by UNIDO under Project No. US/RAS/92/120/PDU/1 and managed through the Regional Programme for Pollution Control in the Tanning Industry in South-East Asia offices (RePRO) in Chennai, the concept was then developed on pilot/demonstration scale in 1997 at two locations in India. Over and above the final UNIDO reports, the technology is summarised in the following selected papers published in World Leather:*

- *Working with Nature (RD) Nov 1995, p41*
 - *Pilot root zone treatment of chemically dosed effluent from leather manufacture (RD) Nov 1998, p55*
 - *Quantifying reedbed performance in India (RD) Nov 1998, p55*
- Enter the root zone: green technology for the leather manufacturer (RD). Part 1 June/July 2001, p63, Part 2 Aug/Sept 2001, p52, Parts Oct 2001, p85.*