Environment/Resources Management

Sewage Treatment

The latest in aquaculture spinoffs: a rock/plant filter system for treating domestic sewage

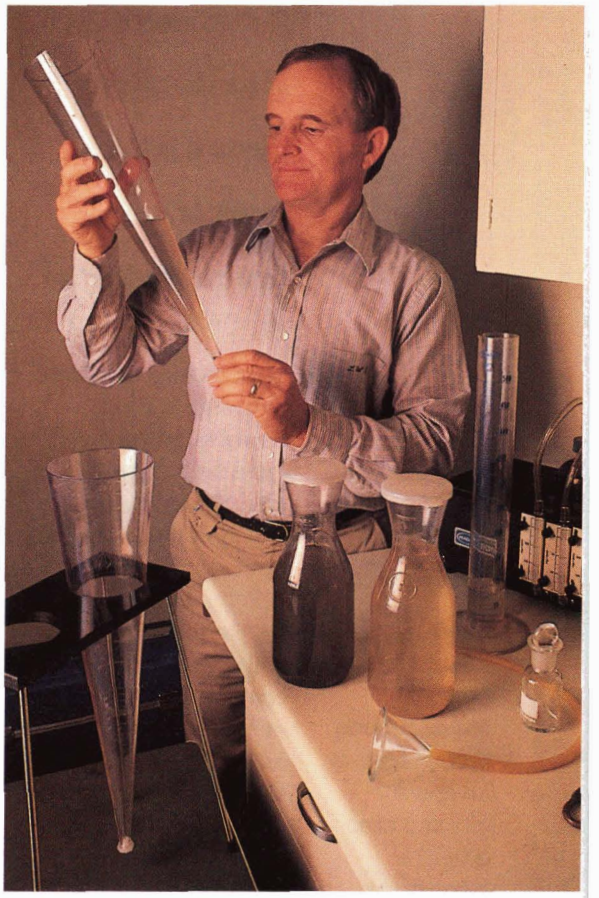
At right is what appears to be — and in fact is — an attractive flower bed at a home in Alexandria, Louisiana. It is, however, more than a floral display; it is part of a functional system that employs plants, rocks and microorganisms as a natural means of treating domestic sewage.

A scaled-down version of a municipal wastewater treatment system, the individual home rock/plant filter system represents one more in a lengthy list of spinoffs from a NASA aquaculture research program conducted by Stennis Space Center (SSC). Since 1974, SSC has been exploring closed systems habitability, edible product growth, water/air reclamation and bioregenerative processes for future spacecraft that may have to spend years in space without resupply from Earth. As part of NASA's Technology Utilization Program, SSC has provided assistance to communities interested in aquaculture as a natural municipal wastewater cleansing technique.

The State of Louisiana has played a pioneering role in applying aquaculture to wastewater treatment. The Louisiana Department of Health and Hospitals, Office of Public Health (DHH-OPH) has experimented with a number of municipal aquaculture systems and published guidelines for their construction and operation. In 1987, the town of Haughton, Louisiana initiated one of the first municipal rock/plant filter sewage treatment facilities. The application of the rock/plant technology to wastewater treatment for individual homes was spearheaded by Larry Amberg, Alexandria-based sanitarian regional manager for Louisiana's DHH-OPH.

A typical home use system consists of a two or three-compartment septic tank (or two/three tanks working in series) for initial sewage processing, together with a natural secondary treatment facility for further processing of the septic tanks' effluent. The latter facility is a shallow, rectangular trench containing marsh plants and rocks (the rock surfaces provide a place for microorganisms to live and grow). The plants and microorganisms work in concert to absorb and digest — and thereby cleanse — the partially processed wastewater. The rock/plant filter bed has no objectionable odors and the system meets Environmental Protection Agency standards for secondary treatment, allowing legal discharge of the cleaned effluent into a stream or drainage canal.

The photo **at left** shows the first step in construction of a rock/plant filter: digging the trench and lining its walls with polyethylene. After that, marsh plants — such as cattails, canna lilies, calla lilies, bulrushes and elephant ears — are planted in



the trench. The next step is illustrated **at left**: the trench is filled with gravel. The "influent" — the wastewater partially processed by the septic tanks — comes into the level trench through a pipe. Particulate matter is forced through the rock bed and is absorbed by the roots of the plants; microbes digest nutrients and minerals from the sewage, further cleaning it. **Above** is a completed, working rock/plant filter being shown to visiting sanitarians and municipal officials. The system has been installed in a score of homes in central Louisiana and it has excited considerable interest among officials from other states.

At right, project leader Larry Amberg of DHH-OPH is testing samples of influent (taken from the septic tank outlet) and effluent (taken from the exit port of the rock/plant filter). The darker liquid in the foreground is the tank-processed influent, the lighter liquid the completely processed effluent, visible evidence that the secondary treatment facility removes a great deal of pollutant material. There is also a significant reduction in odor levels.

The rock/plant filter is useful in rural areas where conventional septic tanks and drainfields have failed. The natural filter system, with its companion septic tank, costs somewhat more (average $1,800 - 1,950) than the conventional tank and soil absorption system ($1,300 - 1,400). Its advantages are its attractiveness and considerably less maintenance than is required by mechanical systems; the only maintenance needed is removal of dead leaves and grass from the floral bed.

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