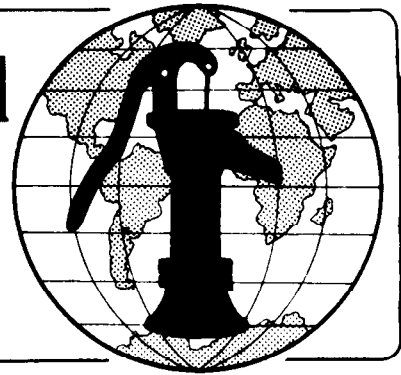


Water for the World



Operating and Maintaining Mechanically Aerated Lagoons Technical Note No. SAN. 2.0.7

A mechanically aerated lagoon is a large, lined excavation that receives sewage, mixes it with oxygen so that biological processes can destroy most of the disease-causing organisms, and discharges the sewage as treated sewage. Operating and maintaining a mechanically aerated lagoon requires the services of an electrician and a foreman experienced with these systems. Operation and maintenance involves starting up the lagoon, inspecting and repairing aerators, maintaining the embankment and the lagoon site, and possibly, after 10-20 years, draining the ponds and removing sludge.

Correct operation and maintenance is important because a neglected lagoon will produce foul odors, become a breeding place for flies and mosquitoes, and require costly repairs. This technical note describes how to operate and maintain a mechanically aerated lagoon.

Useful Definitions

EFFLUENT - Settled sewage.

SLUDGE - Settled solids at the bottom of a lagoon.

TREATED SEWAGE - The liquid that flows out of a stabilization pond (or series of ponds). Treated sewage is safer than settled sewage and may be used to irrigate crops not intended for human consumption.

Caution!

Always wear boots and gloves when working around a mechanically aerated lagoon.

Materials Needed

To inspect and repair aerators: spare parts for aerators and electrical system; electrician's tools; small boat.

To maintain embankment and pond site: shovels, axes, grass and weed cutting tools, cart, flat rocks, mortar.

Other: maintenance shed, warning signs, fencing materials, gloves and rubber boots.

Starting Up a Lagoon

1. Allow effluent to fill the lagoon to its design depth.

2. Position the aerators in the following manner:

a) Secure a mooring line to the post on the embankment and to the aerator;

b) Use a boat to maneuver the aerator in place on the surface of the lagoon;

c) Attach the other mooring line to the aerator, take the line across the lagoon, and secure it to the post in the embankment. The mooring lines should be fairly taut, or else they may become fouled in the aerator's propeller during operation. See Figure 1.

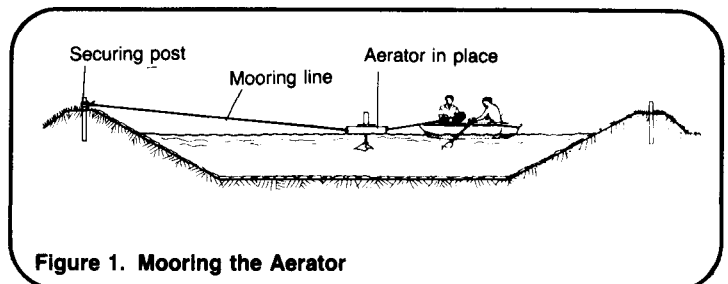


Figure 1. Mooring the Aerator

3. String electric cable from the aerator to the power source on shore. This must be done by an experienced electrician.

4. Switch on the aerators. Depending on their design, some aerators operate continuously, while others are set on timers and operate a few hours each day.

5. Allow treated sewage to be discharged from the lagoon.

Inspecting and Repairing Aerators

Aerators should be inspected periodically according to manufacturer's instructions. If repairs must be made, remove the aerator from the lagoon. Some lagoon systems keep a replacement aerator in the maintenance shed to be used while repairs are made.

Maintaining the Embankment and the Lagoon Site

Make an inspection tour of the embankment and lagoon site every few weeks. If a problem is found, correct it at once. See Figure 2. Table 1 can be used as an aid in regular lagoon maintenance.

Removing Sludge

Because of the efficiency of a well-operated mechanically aerated lagoon, sludge build-up may never be a problem. However, sludge depth should be checked once each year. If the sludge depth rises to one-third the design depth of the lagoon, or to within 50-100mm of the inlet pipe, the lagoon must be drained and the sludge removed. The design depth and the elevation of the inlet pipe should be available from the engineer who designed the project. If the lagoon must be drained, and if the community sewer system is now connected to one lagoon only, either a stabilization pond, even if temporary must be built, or a temporary alternative means of community sanitation must be used. Effluent from a sewer system must not be allowed to flow into a stream, lake, or dry ditch.

Table 1. Maintenance Checklist

Area Inspected	Condition or Problem	Course of Action
Area surrounding lagoon site	New trees or bushes	Cut down and remove
Area surrounding lagoon site	Surface water run-off	Divert water away from lagoon with small dams or trenches
Outside slope and top of embankment	Wind or rain erosion	Fill with soil; plant grass
Outside slope and top of embankment	Long grass or weeds	Mow grass; cut weeds; remove cuttings
Inside slope of embankment	Erosion due to weather or wave action	Replace stones and mortar
Shoreline of lagoon	Weeds	Cut and remove
Corners of lagoon surface	Accumulation of floating debris	Remove debris

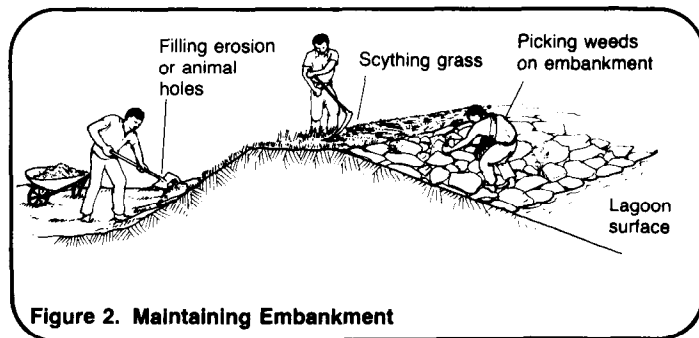


Figure 2. Maintaining Embankment

Checking Sludge Depth. Switch off the aerators. Use a boat and a long wooden pole with a light-colored cloth wrapped around it and tied to one end. Lower the pole to the bottom of the lagoon and after a minute slowly raise it. See Figure 3. Sludge particles will cling to the cloth and the sludge depth can be measured. If the sludge depth is too high, the lagoon must be drained.

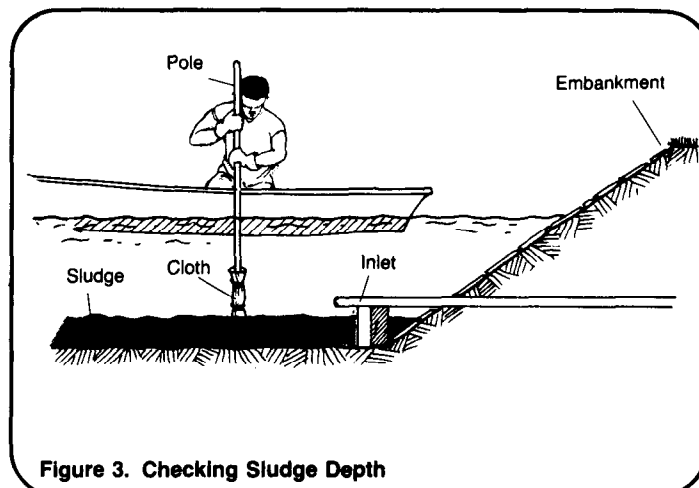


Figure 3. Checking Sludge Depth

Draining the Lagoon. Remove the aerators, mooring lines, and electric cables from the lagoon. Allow the effluent to drain into the stabilization pond by removing the sleeved pipe sections of the vertical outlet one section at a time. This allows you to lower the surface of the lagoon in stages, until the sludge level is reached.

Removing Sludge. Allow the sludge to dry in the sun. This may take several weeks, depending on local conditions. When the sludge is fairly dry, it can be handled with a rubber-tired front-end loader, animal-drawn scoops, or shovels. Load the sludge on trucks or carts and haul it away.

Disposing of Sludge. Dispose of sludge in a landfill or other burial site, or use it to fertilize crops, preferably crops not intended for human consumption. If used for fertilizer, it should be plowed into the ground. Never use sludge to fertilize vegetables which are intended to be eaten raw, such as lettuce.

Re-filling the Lagoon. While the lagoon is empty, check the inlet and outlet pipes for any damage. Repair at once. Replace the sleeved pipe sections of the vertical outlet.

Allow the lagoon to fill with effluent to its design depth. Re-position the aerators, mooring lines, and electric cables, and switch on the aerators.

Other Considerations

Tools for operating and maintaining an aerated lagoon should be kept in a locked shed near the lagoon site. Clean all tools and keep them in good repair. Maintain a record similar to Table 2 showing all maintenance activities.

Caution!

A well-operated and maintained mechanically aerated lagoon will have few odors, and it may appear to children and adults to be a place to swim or wade. Precautions must be taken to keep away unauthorized persons. Post warning signs or erect fences or barricades.

Table 2. Sample Maintenance Record for a Mechanically Aerated Lagoon

Date	Task
1 Jan. '82	Cut grass and weeds on embankment; pulled weeds along shoreline; removed cuttings.
15 Feb. '82	Cut grass and weeds on embankment; pulled weeds along shoreline; removed cuttings.
4 Mar. '82	Removed floating debris; took boat onto lagoon; checked mooring lines. Okay.
30 Mar. '82	Cut grass and weeds on embankment; pulled up weeds along shoreline; removed cuttings.
1 Apr. '82	Repaired rocks and mortared on inside embankment slope.