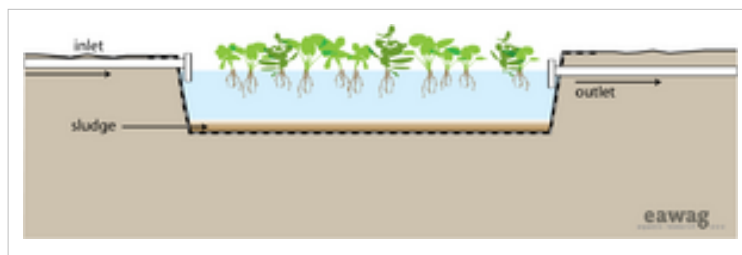


Floating_Plant_-_Macrophyte_-_Pond

Application level		Management level	
Household		Household	
Neighbourhood	X	Shared	X
City	XX	Public	XX



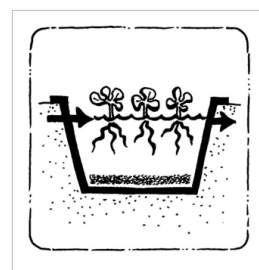
Applicable to systems:	Languages / langues / idiomas		
1, 5, 6, 7, 8			

Inputs: Effluent

Outputs: -

A floating plant pond is a modified maturation pond with floating (macrophyte) plants. Plants such as water hyacinths or duckweed float on the surface while the roots hang down into the water to uptake nutrients and filter the water that flows by.

Water hyacinths are perennial, freshwater, aquatic macrophytes that grow especially fast in wastewater. The plants can grow large: between 0.5 to 1.2m from top to bottom. The long roots provide a fixed medium for bacteria which in turn degrade the organics in the water passing by.



Duckweed is a fast growing, high protein plant that can be used fresh or dried as a food for fish or poultry. It is also tolerant of a variety of conditions and can remove significant quantities of nutrients from wastewater. To provide extra oxygen to a floating plant technology, the water can be mechanically aerated but at the cost of increased power and machinery. Aerated ponds can withstand higher loads and can be built with smaller footprints. Non-aerated ponds should not be too deep otherwise there will be insufficient contact between the bacteria-harboring roots and the wastewater.

Advantages	Disadvantages/limitations
<ul style="list-style-type: none"> - Water hyacinth grows rapidly and is attractive. - High reduction of BOD and solids; low reduction of pathogens. - Low to moderate capital cost; operating cost can be offset by revenue. - Potential for local job creation and income generation. - Can be built and maintained with locally available materials. 	<ul style="list-style-type: none"> - Can become an invasive species if released into natural environments. - Requires large land (pond) area.

Adequacy

The technology can achieve high removal rates of both BOD and suspended solids, although pathogen removal is not substantial. Harvested hyacinths can be used as a source of fibre for rope, textiles, baskets, etc. Depending on the income generated, the technology can be cost neutral. Duckweed can be used as the sole food source to some herbivorous fish.

This technology is only appropriate for warm or tropical climates with no freezing temperatures, and preferably with high rainfall and minimal evaporation. Different, locally appropriate plants can be selected depending on availability and the wastewater type. Trained staff is required for the constant operation and maintenance of the pond.

Health Aspects/Acceptance

Water hyacinth has attractive, lavender flowers. A well designed and maintained system can add value and interest to otherwise barren land. Adequate signage and fencing should be used to prevent people and animals from coming in contact with the water.

Maintenance

Floating plants require constant harvesting. The harvested biomass can be used for small artisanal businesses, or it can be composted. Mosquito problems can develop when the plants are not harvested regularly. Depending on the amount of solids entering, the pond must be desludged periodically.

Acknowledgements

The material on this page was adapted from: Tilley, E. et al. (2008). Compendium of Sanitation Systems and Technologies ^[2], published by Sandec ^[3], the Department of Water and Sanitation in Developing Countries of Eawag ^[4], the Swiss Federal Institute of Aquatic Science and Technology, Dübendorf, Switzerland. The publication is available in English, French, and will be made available in Spanish. Available in the IRC Digital Library ^[5]

References and external links

- Abbasi, SA. (1987). Aquatic plant based water treatment systems in Asia. pp 175–198, In: Aquatic Plants for Water Treatment and Resource Recovery, K.R. Reddy and W.H. Smith (eds.), Magnolia Publishing Inc., Orlando, Florida.
- Bagnall, LO., Schertz, CE. and Dubbe, DR. (1987). Harvesting and handling of biomass. pp. 599–619, In: Aquatic Plants for Water Treatment and Resource Recovery, K.R. Reddy and W.H. Smith (eds.), Magnolia Publishing Inc., Orlando, Florida.
- Crites, R. and Tchobanoglous, G. (1998). Small and Decentralized Wastewater Management Systems. WCB and McGraw-Hill, New York, USA, pp 609–627. (Comprehensive summary chapter including solved problems)
- Gerba, CP., et al. (1995). Water-Quality Study of Graywater Treatment Systems. Water Resources Bulletin 31(1): 109–116.
- Iqbal, S. (1999). Duckweed Aquaculture-Potentials, Possibilities and Limitations for Combined Wastewater Treatment and Animal Feed Production in Developing Countries. Sandec, Dübendorf, Switzerland.
- McDonald, RD. and Wolverton, BC. (1980). Comparative study of wastewater lagoon with and without water hyacinth. Economic Botany: 34 (2): 101–110.



- Polprasert, C., et al. (2001). Wastewater Treatment II, Matural Systems for Wastewater Management. IHE, Delft. (Comprehensive Design Manual: see Chapter 4 – Water Hyacinth Ponds.)
- Rose, GD. (1999). Community-Based Technologies for Domestic Wastewater Treatment and Reuse: options for urban agriculture. IDRC, Ottawa. Available: <http://idrinfor.idrc.ca>
- Skillicorn, W., Journey, K. and Spira, P. (1993). Duckweed aquaculture: A new aquatic farming system for developing countries. World Bank, Washington, DC. Available: <http://www.p2pays.org/ref/09/08875.htm> (Comprehensive manual)
- US Environmental Protection Agency (1988). Design Manual: Constructed Wetlands and Aquatic Plant Systems for Municipal Wastewater Treatment. USEPA, Cincinnati, Ohio. Available: <http://www.epa.gov/owow/wetlands/pdf/design.pdf>

References

- [1] http://www.eawag.ch/organisation/abteilungen/sandec/publikationen/compendium_e/index_EN
 - [2] http://www.eawag.ch/organisation/abteilungen/sandec/publikationen/publications_sesp/downloads_sesp/compendium_high.pdf
 - [3] http://www.eawag.ch/organisation/abteilungen/sandec/index_EN
 - [4] http://www.eawag.ch/index_EN
 - [5] <http://www.irc.nl/docsearch/title/163208>
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