Deep Pond™ System (Hyderabad) Case Study

Special Note:
This demonstration project was indirectly impacted by the Tsunami devastation of December 26, 2004. This project site is only about 300 Km (200 mi) from the shoreline of Southeastern India. Nearest coastal town of Machilipatnam was impacted by the Tsunami. We have rendered some relief effort to the area.
See pictures at:
http://blueyamuna.tripod.com/tsunamirelief/
And related information at:
http://blueyamuna.tripod.com/tsunami3.htm

This project involves implementing a low-cost wastewater treatment system at the Jawaharlal Nehru Technological University (JNTU) campus in Kukatpally, greater Hyderabad, Andhra Pradesh, India. The project consist of an anaerobic, deep pond, which uses a digestion chamber for degrading various types of sewage sludge and the solids from the influent wastewater stream. This system has the potential to generate and capture methane gas for various beneficial uses when the influent solids volumes are high. At the present time the volume of solids flowing into the system are quite low and an insignificant amount of methane gas is generated at the facility. The anaerobic digestion is expected to keep the solids level at or below 3 feet from the bottom of the pond and is not expected to increase beyond the bottom 4 feet of the pond for over 20 years as experienced by similar systems in the U.S. The effluent is being used for irrigating the nearby orchard of JNTU.

During September 2004, Subijoy Dutta of S & M Engineering visited the site for the second time and conducted the system inspection after 20 days of the initial startup of the Deep pond system on August 30, 2004. Delta Business Services, along with their contractors and field engineers worked on various kinks and other subtleties of the system to fine-tune the treatment process.

During August 2004, Subijoy Dutta of S & M Engineering visited the site and conducted the system inspection and testing prior to the initial startup of the Deep pond™ system. Delta Business Services along with their contractors and field engineers completed the final piping, electrical, spillways, and all other ancillary construction work to get the system ready for the startup. Figure 1 shows a schematic of the Deep pond™ system.

One important aspect of this system is its sheer simplicity. **The complete treatment system has only three moving parts**. During the site visit after the system was in operation for about three weeks Mr. Dutta of S & M Engineering went down to the influent level of the deep pond where sewage was getting collected by gravity flow and treated/digested by the anaerobic bacteria. To his surprise there was no odor during the fifteen minutes he spent sitting close to the raw sewage (see Figure 2).

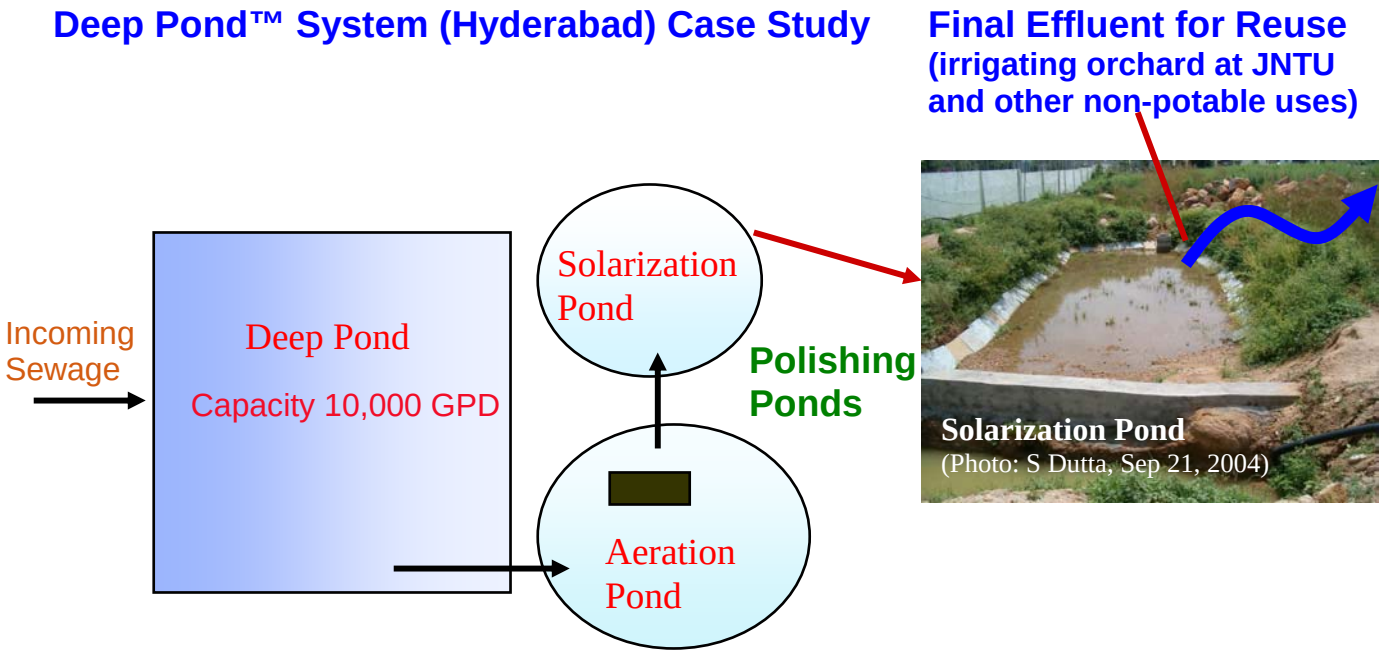

Figure 1. Schematic of the deep pond™ system

Figure 2 shows the Deep pond™ (Pond #1).

Advantages and Benefits of Using a Deep pond™ System:

1. This system can be used in most places around the world with multiple benefits of clean water, energy production and other beneficial uses such as irrigation, fish culture and recreation.
2. It is relatively simple to install, operate and maintain. It has a very low maintenance cost and requires lesser manpower to operate and maintain.
3. The Deep pond™ system installed in Hyderabad is treating 10,000 Gallons per Day with only three (3) moving parts.

4. No chemicals are used for treatment, so there is no hazard to human, plant or animal life. The treated water can be reused with very little post-treatment or polishing.
5. This system does not produce any sludge, since anaerobic digestion causes the sludge to be transformed into methane, carbon dioxide, and water. Past experience with this system in US required no sludge removal for 20+ years.
6. This system is flexible. Once it is installed, its treatment capacity can be increased by adding ponds in parallel trains.

System Performance and Preliminary Results:

Since the Deep pond™ system has a total detention time of about 45-50 days, depending upon the influent load. According to the latest communication from the Deep pond™ site in Hyderabad conveyed Mr. Koduri, the aeration pond has reached the discharge height and started to discharge treated effluent to the settling tank. Water samples were collected in the 3rd week of December, 2004 and the sampling results were sent to S & M Engineering Services, Maryland.

The results from this very first water quality sampling event are summarized in Table 1. The following preliminary observations from these data are furnished below:

- The results seems to indicate that the Deep Pond (Pond #1) and the aeration pond (pond #2) is working very effectively. The direct effect of aeration by the diffusers helped almost double the oxygen level (DO) of the water (from 3.3 mg/l to 6.4 mg/l) while passing through the aeration pond (Pond #2).
- It seems that the system did not reach steady state yet because of the low flow volume into the system. Due to school closings and vacations, the system was receiving less than 20% of the designed flow for the past three weeks resulting in a high retention time (lack of sewage) and presence of algae in the pond.

Table 1. Preliminary Results from the Deep pond™ Site (Hyderabad, India) Dec. 27, 2004 .

Number	**Sampling Point**	**Electrical conductivity** (µmho/cm)	**PH** (SU)	**Total solids** (mg/L)	**Organic solids** (mg/L)	**BOD**** (mg/L)	**COD**** (mg/L)	**DO**** (mg/L)
1	Inlet Of Deep Pond (Pond #1)	762	7.28	600	140	18	24	3.9
2	Outlet Of Deep Pond (Inlet Of Pond#2)	756	6.9	620	160	3.6	48	3.3
3	Outlet Of Pond #2	765	7.1	760	200	9.6	39	6.4 ++
4	Inlet of Settling Tank (Structure upstream of Pond #3)	724	7.06	680	220	3.0	16	4.9

** BOD – Biochemical Oxygen Demand; COD – Chemical Oxygen Demand; DO – Dissolved Oxygen

++ - Note the effect of aeration – The Oxygen content is almost doubled at the effluent of Pond #2