Tropical Environmental Health

Sanitation 2
Elevated Toilet:
For use in areas with high water table!
We have examined methods for disposal of faecal matter: Now consider what happens with the effluent

- In any system using water, the effluent must be disposed
- Effluent consists of sullage water (i.e. laundry, kitchen, cleaning.
- Toilet water containing faeces, urine and other effluent.
- Real engineering principles apply; however in many developing countries this is left to providence....
Role of the septic tank

- Anaerobic fermentation of solids
- Reduce the load of pathogens in the effluent
- Hold the effluent for 2-3 days for improved safety
- Retain solid material to prevent blockage of further disposal system
The soak-away

Absorption Field Treatment of Septic Tank Effluent
The field requires periodic maintenance, diversion of the flow at distribution box and repacking of the rock fill, removal of plant roots etc.
Connection to a sewage system: what are the alternatives?

- Conventional sewage connection... expensive
- Small bore sewage system: less expensive
- Use road-side drains, and hope for the best....
- Unfortunately this is the common outcome
Comparison between the sewage systems

Storm Sewer

Combined Sewer

Sanitary Sewer
Small bore is near surface, and runs full
Small bore is PVC pipe, conventional is made from concrete
Conventional requires heavy machinery and regular pumping stations to maintain flow.
small bore installation is simpler, and as the pipes are light and fit in small trenches
Sewer lines can rise or fall, the system operates under slight pressure
There is a BIG – but! Small bore systems cannot handle solids. So all connections MUST be to septic tanks.
Where do we go from here:

• The effluent must be disposed of in a sanitary manner
• The system should be inexpensive and easy to manage
• Tropical areas do have long hours of sunlight, why not exploit this.
• We can by using oxidation ponds…
Lay out of an oxidation pond system

Stabilization Pond Layout and Details

Plan layout (not to scale)

Detail of a typical embankment
New cells → Algae → O₂ → Bacteria → Organic matter → New cells

CO₂ nutrients → Algae → Light
Three processes of stabilization: anaerobic
The second process is facultative.
In the maturation pond, pathogens are reduced: the water can be released to a river.