Technological Choices in Township and Village Waste Water Treatment

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1) Significance of Establishing Wastewater Discharge Systems in Villages and Townships

- Establishing wastewater discharge systems is a key component of constructing New Villages, and has these goals and points of significance:

1. Improving the living conditions of rural populations; improving and maintaining rural environmental sanitation
2. Reducing environmental pollution

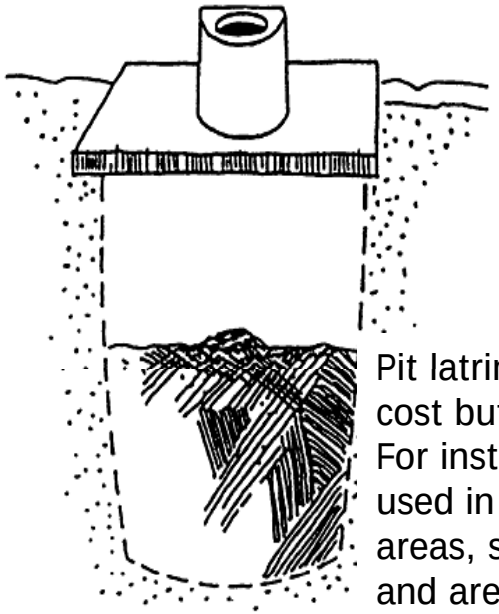
Dry Pit Latrine

The dry pit latrine system is the earliest waste water disposal system in the history of human settlement and is also an economical and effective method for maintaining the cycles of beneficial substances.

In history, farmers always nurtured the land by organic waste and their own human waste. The main problem is that sanitary conditions are not sufficient.

Non-flushing latrines

The pit latrine is often seen around the world. It can seal away and store human waste for long periods.



Pit latrines are simple and low-cost but also have shortcoming. For instance, they cannot be used in densely populated areas, stone-floored houses, and areas with high water tables or seasonal heavy rains

Dry and Semi-Dry Pit Latrines

Rural areas still commonly use the dry pit latrine. Although from a material human settlement and agricultural recycling perspective, it is an ideal method, its **problems** should not be ignored:

1) Many Chinese village use quite **primitive dry latrines** that lack sanitary management, which then become channels for spreading disease and epidemics.

2) Most rural pit latrines do not have conditions for **stabilizing human waste**: fresh waste mixes with stablized waste.

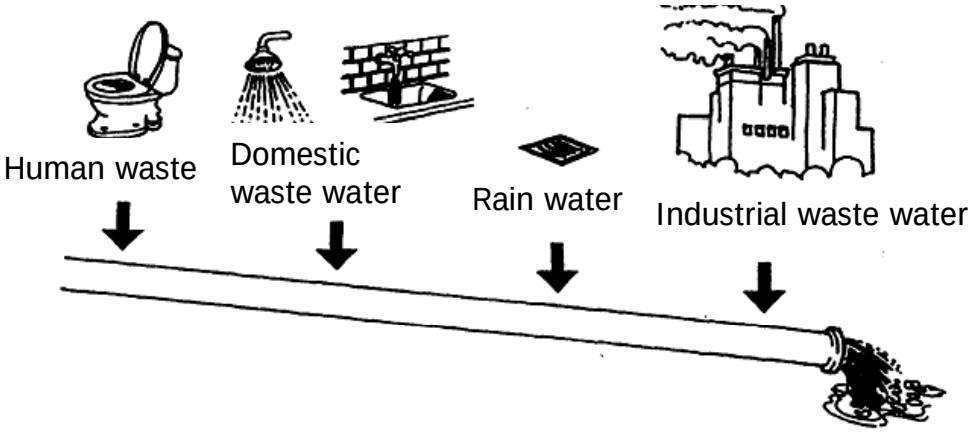
3) The reasons for a **decline in use of rural waste as fertilizer** are its instability, unsanitary conditions, and primitive operations.

Thus, at least in villages with relatively lower living standards, ecological latrines that meet modern sanitary needs are important to sanitary improvement, pollution control, and positive ecological cycles.

The flush toilet: a symbol of modern civilization

Flush-based waste disposal system

In order to flush away 400-500 L of urine and 50 L of fecal matter per year, 15,000 L of clean water is needed. Another 15,000-30,000 L is needed for bathing, kitchen use, and laundry. Aside from this, in waste water pipes also carry rain water and heavily polluted industrial waste water.



In a flush-based system, small amounts of toxic human waste pollutes a large amount of water, and in many cases is channeled back to surface water without treatment

Medieval Europe

Human waste should be processed separately

Nutrient (pollutant)	Annual burden (Kg /person)	Urine (yellow water) 500 liters/ person /year	Fecal matter (Brown water) 50 Liters /person /year	Other waste water (grey water) 2500～10000 / person /year
N	～4～5	～87%	～10%	～3%
P	～0.75	～50%	～40%	～10%
K	～1.80	～54%	～12%	～34%
COD	～30	～12%	～47%	～41%

- The main nutrients in waste water (N, P, K) are mainly contained in urine, and if small amounts of urine could be isolated, it could be used in agriculture
- Fecal matter also has considerable amounts of nutrients
- Non-toilet water (grey water) has relatively less nutrients and pollutants, but comprise 50-200 times the volume of annual human waste
- Human waste contains the vast majority of pollutants and nutrients in all waste water, so if it could be processed separately, processing costs could be reduced and recycle nutrients

2) Options for small-scale waste water treatment technology

Natural processing technologies including:

- Constructed wetland pond treatment

Limitations: Consumes too much land area

- Biological filter treatment

Limitations: Effects are unstable

- Oxidation pond treatment

Limitations: Effects are unstable

2) Options for small-scale waste water treatment technology

- Centralized processing technology for village and township domestic waste water, such as:
  - Active sludge method
  - Sequencing Batch Reactor (SBR) method
  - Oxidation ditch method, etc.

Limitations: Large investment for piping network, high processing cost

2) Options for small-scale waste water treatment technology

- Decentralized waste water treatment technologies (e.g. small-scale waste water treatment equipment) are projected to have significant market demand

Parting words

- 谢谢大家!
- THANK YOU VERY MUCH