Ecological Sanitation in Bangladesh

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Environmental Pollution in Bangladesh -1

The indiscriminate disposal of grey water, excreta and organic wastes into living environment causes:

Fig.1: Open Defecation

- spread of diseases,

- squanders valuable nutrients that could otherwise augment the production of food by properly treating and recycling.

❖ more than 43% of households do not have access to the sanitation system.

Environmental Pollution in Bangladesh-2

- The use of such fresh sewage and greywater is not recommended for aquaculture by WHO because of potential danger to public health.

- Thus alternative wastewater treatment methods are needed to recycle nutrients from greywater and excreta into useful product to safeguard overall environ-mental degradation.

Recycling of Wastes

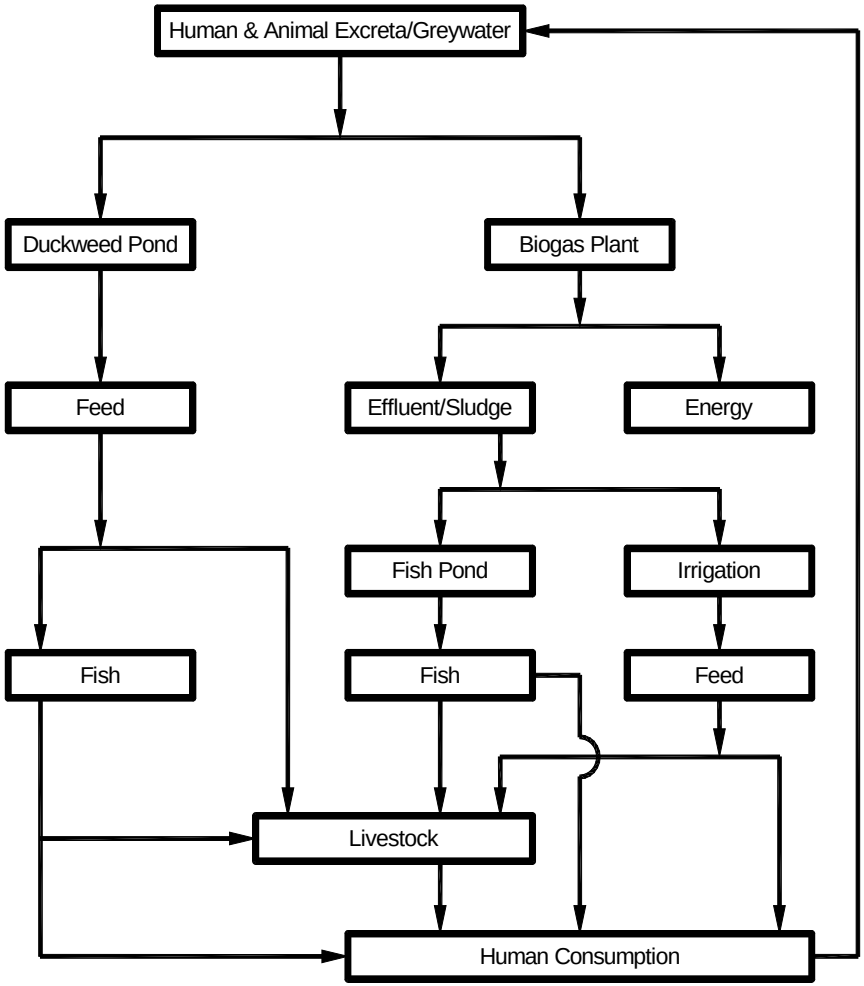


Fig.2: Recycling of Wastes

Fig.2 presents:

- recycling of greywater and excreta in agriculture and aquaculture;
- reduce the gap between food production and need; and,
- minimise the risk to public health.

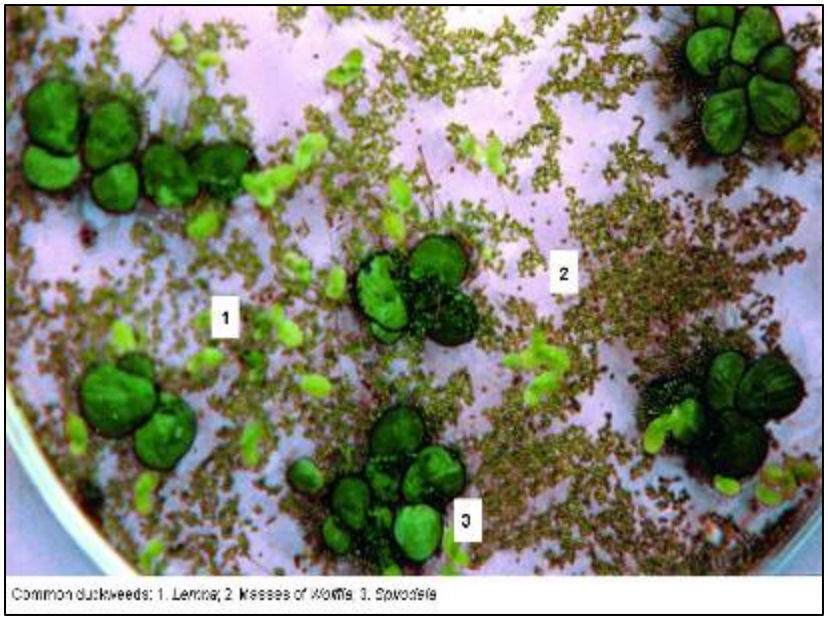
Ecological Sanitation

The scheme presented in Fig.2 saves:

- huge amount of water;
- does not pollute;
- returns the valuable nutrients in wastewater and organic wastes into the environment; and,
- meets the basic requirements of ecological sanitation.

Duckweed Cultivation

Fig. 3a Cultivation of Duckweed



Common duckweeds: 1. *Lemna*; 2. Masses of *Wolffia*; 3. *Spirodela*

Fig. 3b Duckweeds

Biogas Technology (Fig.4)

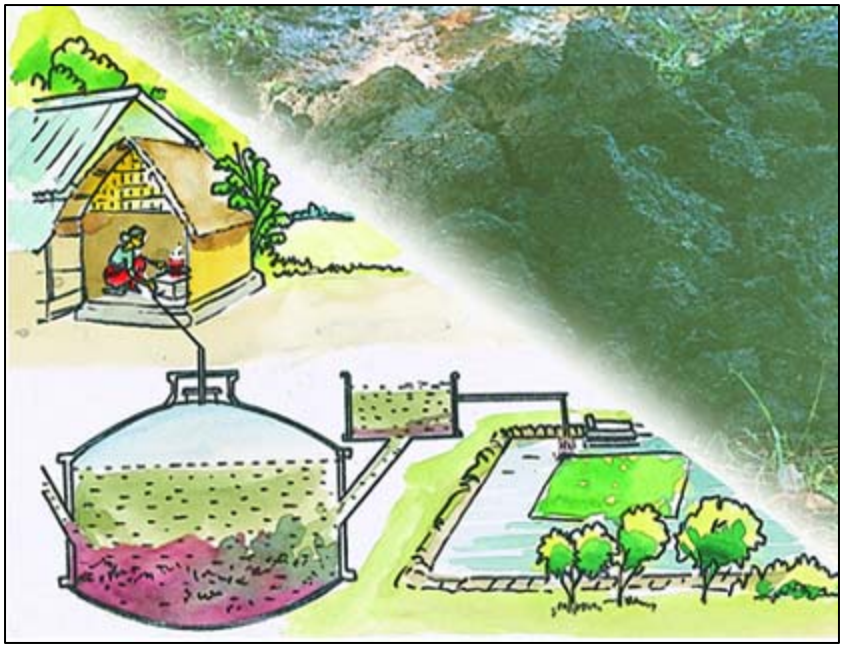


Fig. 4 a

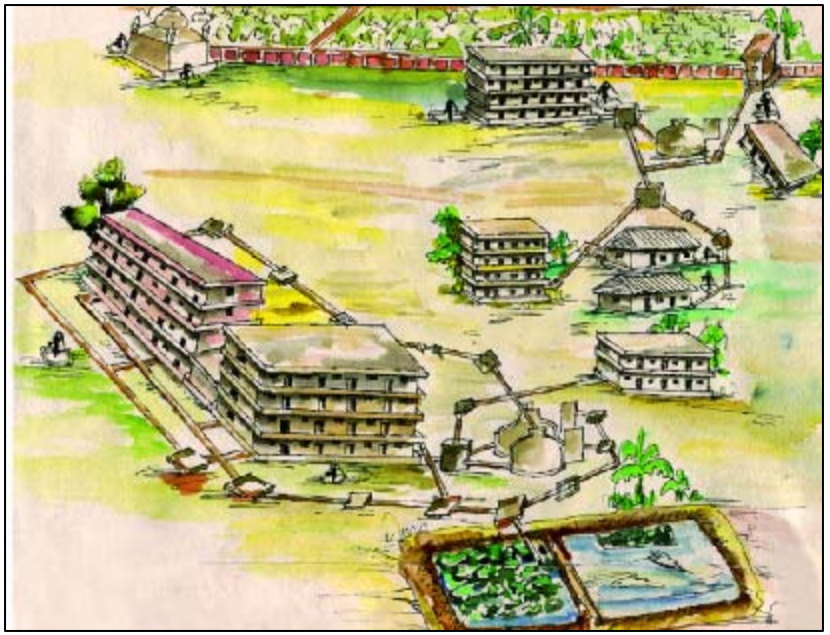


Fig.4 b

Biogas Plants in Operation

- Around 25 thousand biogas plants in Bangladesh.
- 15 million households in rural China by the end of 2004
- In India around 3.67 million biogas plants by the end of 2004 ,
- In Nepal (around 16 thousand) and,
- In Vietnam (around 23 thousand).

Table 1: Potential of biogas generation in Bangladesh

Feed material	Total population ($x10^7$, nos.)	Waste disposal rate (kg/head /day)	Gas production rate(m^3/kg)	Amount of gas,($x 10^6$, m^3/day)
Human excreta	11.50	0.40	0.07	3.22
Cattle and buffaloes dung	2.42	11.50	0.03	8.35
Sheep and Goat dropping	3.33	1.50	0.04	2.00
Poultry manure	13.79	0.18	0.06	1.49
			Total volume	15.06

Source: Rahman (1996)

Potential of Biogas Plants-2

- The biogas can supply clean energy to cook three meals or a population of about 7.3×10^7, about 63 % the total population of Bangladesh in 1996.

The daily fertiliser contribution equivalent to:

- 2,665 tonnes of urea;
- 6,725 tonnes of super phosphate; and,
- 1,225 tonnes of muriate of potash.

Environmental/ Ecological Sanitation

The biogas technology has a great potential of:

- supplying nutrients;
- mitigating several problems related to eco-logical imbalance;
- minimise crucial fuel demand;
- improve hygiene;
- health conditions; and
- cost-effective in Bangladesh.

Composting of Solid Waste

Recycling of Organic Wastes Growing concerns relating to:

- land degradation;
- threat to eco-systems due to ever increasing domestic wastes and from over and inappropriate use of inorganic fertilizers;
- atmospheric pollution; and,
- sanitation problems have rekindled global interest in organic waste recycling practices like composting.

Figure 5: Characteristics of domestic solid waste in Dhaka City

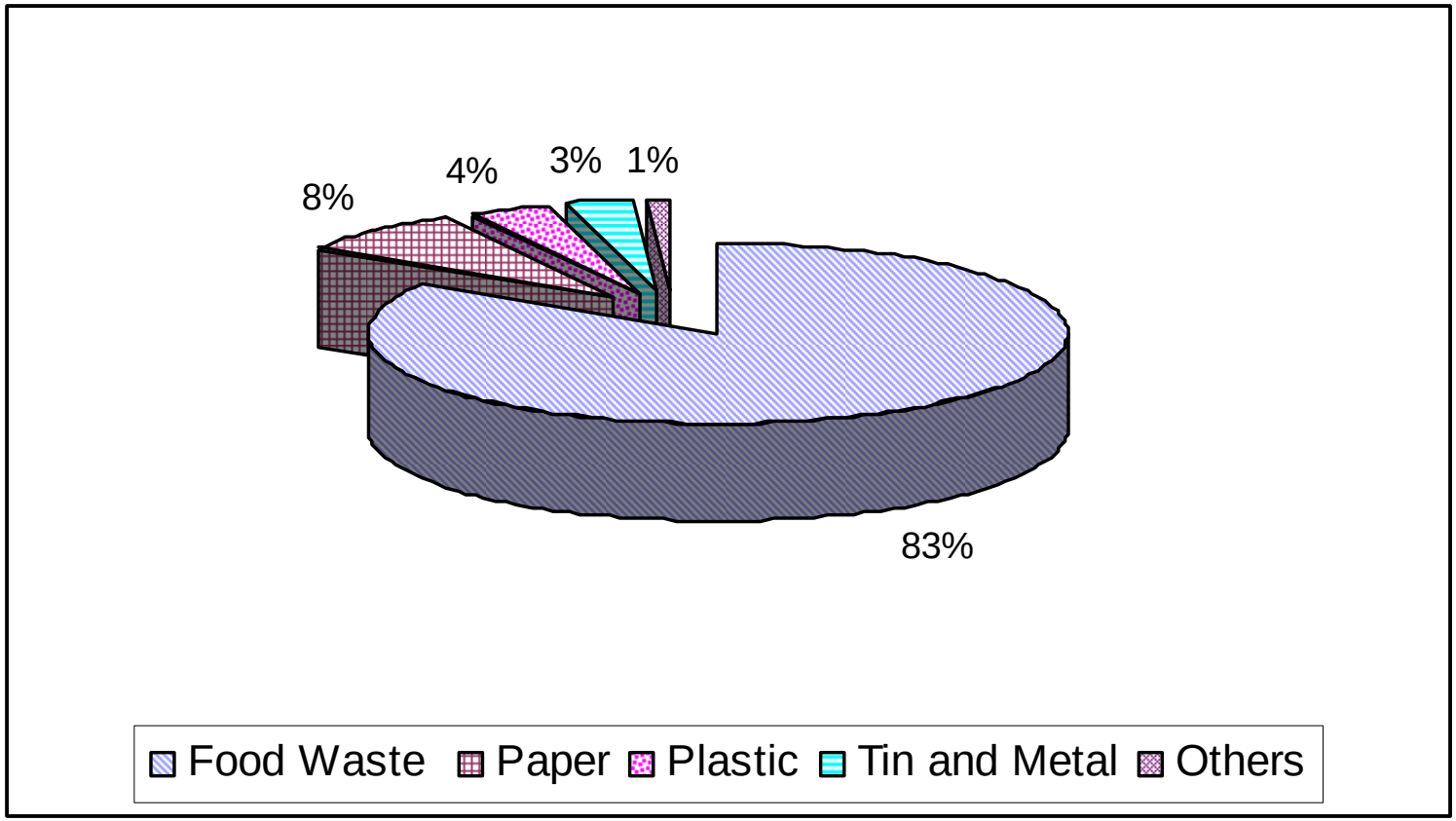


Fig. 6a Box type Composting Plants

Fig. 6b Barrel Type Composting Plants

Table 2: Destruction of Some Common Pathogens and Parasites at Elevated Temperatures.

Organisms	Observations
Salmonella Typhosa	No growth beyond 46^{0}C; death in 30 min. in 30 min at 55-66^{0}C and 20 min, at 60^{0}C; destroyed in a short time in compost environment
Salmonella spp.	Destruction within 1 h at 55^{0}C and 15-20 min. at 60^{0}C
Shigella spp.	Destruction within 1 h at 55^{0}C
Escherichia coli	Destruction within 1 h at 55^{0}C and 15-20 min. 60^{0}C
Entamoeba histolytica cysts	Destruction within a few minutes (mins.) at 45^{0}C and within a few seconds at 55^{0}C
Taenia saginata	Destruction within a few mins. At 55^{0}C
Necator americanus	Destruction within 50 mins. at 45^{0}C
Ascaris lumbricoides eggs	Destruction within 1 hour at 50^{0}C
Sources: Rahman et al (2007)	

Problems and Research Needs

- The implementing authorities in Bangladesh are mainly active in promoting waste recycling technologies, without proper attention to research and development to renovate and optimise the design by suiting them to the local condition.

- And have limited research and development capabilities and limited co-ordination among the researchers and implementing authorities.

- Very limited follow-up action program.

Conclusions

- The planned use of greywater and excreta as presented in Fig. 2 and composing of organic wastes achieves the basic requirements of ecological sanitation.

- There is an urgent need to develop an indig-enous technical expertise, together with strong national coordination among different implementing authorities, and research institutions to provide improved design guide-line for their effective use, and to disseminate resource recovery information in a meaningful way.

Thanks All