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PEOPLE-CENTRED APPROACHES TO WATER AND ENVIRONMENTAL SANITATION

Piloting Ecological Sanitation Toilets in Peri -Urban Community of Nepal

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Concept of Ecological Sanitation; referred as ECOSAN, integrates sanitation and agriculture by using human waste as fertilizer and soil conditioner. The ECOSAN concept has been applied in Siddhipur village of Lalitpur District, which is nearby urban settlement of the Kathmandu Valley, Nepal. The project, initiated on a small scale as a pilot project, is first of its kind in the country. The ECOSAN toilets in this village have been implemented after the demand from the community for proper management of their wastes. Main thrust of constructing ECOSAN toilets is due to their potential of preventing groundwater pollution, reuse in agriculture and management of sanitary waste. The acceptance, active participation, sharing of cost for building ECOSAN units and use of urine in agriculture are few of the indicators of sustainability of the project. The significant impact on the whole community has given impetus for replication to other areas as well.

Introduction

Ecological Sanitation, referred as ECOSAN, considers human excreta as resource and not as waste as understood earlier. It believes in reduction of human wastes (faeces and urine) into non-toxic forms of compost and include in farming system. Thus, it aims not only at easing personal and environmental pollution pressures but also the over burden on farm and farmers, posed by regular depletion of plant nutrients from soil and use of costly chemical fertilizers. According to this new system, very little water is required, thus it is appropriate to solve the water shortage problem too.

Researches have proven that human wastes in the open space are reduced by natural factors (heat) to many disease-causing products. Many clinical pathogens, frequently found in faeces, cause diseases through air breathing. Contamination of water bodies not only harms aquatic lives but also humans (UNICEF, 2001). These phenomena are very usual in Nepalese context.

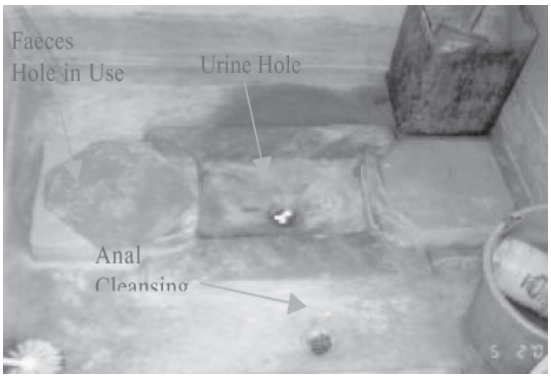
In Nepal, the most prevalent drinking water resource is open water-bodies and only about 30% people have access to proper sanitation facilities. Direct use of water from contaminated sources or consumption of infected aquatic food has resulted into deteriorated human health and hygiene. Burrowing of contaminated wastes into pit or simply dumping them off to nearby natural water bodies does not sound logical and neither supports the present world trends towards preservation of natural environment. The modern water and wastewater management system and technologies are very costly. The cost and complications involved in the construction of prevalent septic toilets and that required by sewer systems are neither desirable nor feasible in our context. It is in this context that Development Network Pvt. Ltd. introduced ECOSAN concept for the first time in Siddhipur Village Development Committee (VDC) of Lalitpur district, Nepal (Photograph 1).

Photograph 1. View of Siddhipur Village

The multi-dimensional nature of ECOSAN toilet system has high feasibility factors for the communities of Siddhipur VDC in Lalitpur District, where major drinking water source is direct (untreated) river water or shallow dug wells. They do not have any sewer system, house toilets are scanty and groundwater table is also high (3-4ft). ECOSAN toilets eliminate problems arising from earlier unhygienic practices of using human waste in the field, thus vegetable farming have even more high market potentialities.

Design aspect of ECOSAN toilet

The ECOSAN toilet described here is a urine-separating or non-mixing system that enables the separate storage of urine and faeces. Urine is collected in a separate covered chamber, and faeces collected in double vaults, each designed to be used for a six-month period. Anal cleansing needs to be



Photograph 2. ECOSAN Unit

done within the pedestal by shifting to the location specified which has been made suitable for people of most ages (Photograph 2). But the design is yet to consider facilities for disabled people. The very little amount of water that is used during anal cleansing and toilet cleaning is diverted to a wetland chamber containing a filter made up of gravel and sand. Plantations can be done in this wetland chamber. This eliminates the possibility of mixing of urine and anal cleansing effluent and preventing mixing of water with faeces. Faeces, collected in a separate chamber (Vault), are mixed with ashes, soil, leaves, grass, sawdust or any other available suitable bulking material. By not mixing the urine, "the natural fertilizer", with faeces containing most of the pathogens, the bad smell from the toilets is very much reduced. It also means that the treatment of the two ingredients can be done in a proper way; urine to the fields as fertilizer, and faeces kept under control to minimize the effects of pathogens and intestinal parasites, and later used in the field as soil conditioner after decomposition.

The ECOSAN toilet in Siddhipur VDC has been constructed above the ground to keep the end product out of ground and surface water. The ECOSAN toilet has been so designed that it can be constructed very economically with most of the locally available materials and manpower. The two vaults are each 0.35 cu.m, assuming that 40 kg of faeces are produced per person per year and 6 persons per family using each vault for six months. Each vault when filled up to two third shall be closed and the other one shall be used. This volume also considers 25% for the bulking material, i.e. ashes used in this case.

The urine chamber outside is constructed to store urine for a week. This collected urine can then be used as natural fertilizer as it contains appropriate amounts of Nitrogen, Phosphorus and Potassium required by the plants (Table 1). The figures are based upon about 40 kg of faeces and 500 liters of urine produced per person per year.

Table 1. Nutrients contents in urine and faeces

Nutrients	Urine	Faeces
Nitrogen (kg)	4.0	0.55
Phosphorous (kg)	0.4	0.4
Potassium (kg)	0.9	0.37

Source: Steven A Esrey *et al*., (2001)

Social Acceptability of ECOSAN toilet

The cost sharing by the owners and voluntary participation in overall program implementation by the local leaders and owners is praiseworthy and encouragement for further replication. It has been found that the people of Siddhipur VDC have accepted the concept of ECOSAN toilet, as more and more people are demanding the same for them. Even the households that have toilets with septic tank are willing to build ECOSAN toilets due to its environmental benefit. Moreover, the after use of toilet product has attracted them.

The ECOSAN project has found its importance in the community because of following reasons:

- **People defecate in open land or by the side of watercourses**: The community consumes water from open shallow well, dug frequently round the community area, or from Godavari River nearby. Water from the river is distributed to community for drinking through diversion with simple intake without any treatment. Only few dug wells are found to have been chlorinated.
- **Most of the people have their own land for cultivation**: The manure from ECOSAN toilets could be beneficially used to increase fertility of the farmland.
- **Faeco-friendly society**: People are traditionally habituated to the use of composted human faeces and urine and thus their traditional habits appreciatively meet the project objectives.

Probably the most unfamiliar aspect of ECOSAN options is that it requires some handling, at the household level, of the toilet products. Some concerns have been voiced about the cultural acceptability and health aspects of this handling in different parts of the world, while some cultures do not mind handling human excreta (what we call faecophilic cultures), others find it ritually polluting or abhorrent (we call it faecophobic). Most cultures are somewhere between these extremes and when people see for themselves how a well managed ECOSAN system works, most of their doubts vanishes. Thus we should not presuppose the culture but carryout trials (Esrey et al., 2001).

However, by the mere construction of ECOSAN toilets, it would be rather difficult and too early to say that the health and hygiene situation of this particular village will significantly improve. However, the sanitary and hygienic improvement in the users' households is needed too, which is possible when there is an attitudinal and behavioral change in people. If the project could be extended with replications to more and more households (where demand is too high) then overall sanitary and hygienic conditions of the village could be improved. Moreover better agriculture productivity along with reduction in use of chemical fertilizer could be achieved. In this way, overall environment of the village could be enhanced.

Photograph 3. ECOSAN toilet in use

Conclusion

The completed units of ECOSAN toilet have been in full operation since 6 months (Photograph 3). Monitoring of the toilets regarding its use, problems, and application of urine as fertilizer and decomposition of excreta were carried out for five months. The results showed that excreta are ready to be used as soil conditioner as there were no parasites (Ascaris) observed (Photograph 4).

The urine chamber is emptied every week and applied in the field as fertilizer. As the villagers are used to for handling them there is no such barrier. Among the households using this type of toilet have also experimented with the use of urine as fertilizer and the results of agriculture production have been very encouraging, as the outputs were equally good compared to the use of chemical fertilizers.

The local people have also been very cooperative from the beginning till date. The acceptance, active participation and sharing of cost of the ECOSAN unit has proved the active participation and commitment of the people for replication (Photograph 5). The total cost of an ECOSAN unit is about NRs. 16000 (US $215), for which, each household contributed about 50% (full superstructure cost, about US $110) and the project contributed for remaining 50% (full substructure cost). Also modification in design regarding decrease in height, use of plastic flush doors, taps and use of bamboo/brick walls in combination are being considered for reducing cost.

Photograph 4. Decomposed excreta

The community is demanding more toilet units and hence it is seen that there is a lot of scope for the expansion of this project into more households. From the results of the pilot structures and the demand that is available at the moment, it is clear that, the future of ECOSAN in Siddhipur is bright. This is also true due to the poor economic situation in our country (for adopting sewerage system), high water table problems, increased need for organic fertilizer (industrial fertilizer is not adequately available and expensive) and the current international wave of a need for closed loop of nutrients. Alternative approaches need to be given to the users, where they feel comfortable and also can adapt their own techniques. ECOSAN has been given to the people of Siddhipur VDC as one of the options for disposing human waste in a scientific way and also preserving their traditional approach as well and they could avoid direct handling of fresh waste. The end use product of ECOSAN toilets has attracted the community. As mentioned earlier, software components and hardware components need to be amalgamated. Training, motivation, subsidization need to be given due attention before launching the ECOSAN system in new context.

Photograph 5. Participation and agricultural use

Various stakeholders need to be involved including GOs, NGOs, INGOs, private sectors, research institutions and donor communities; sharing of information need to be done among these institutions for better performance record, database setup and rife spreading of the technology (Manandhar, 2002). Ecological sanitation is an approach, a way of thinking, rather than a technology or a device. The approach is characterized by 'closed-loop' thinking and practice, whereby the human need for a safe, congenial and dignified means of sanitation is met, the nutrients excreted are safely redeployed in agricultural production, and ecological security is maintained. 'Bottom-up' approaches (as used in grass-roots development), and 'top-down' approaches (guided and promoted by government) are not mutually exclusive and both are needed. Affordability at both the household and national level is an important issue.

The ECOSAN technology should not be promoted for its own sake, but by empowering people, making them aware of high resources within their wastes, entrepreneurship development and using indigenous styles rather than replacing them with modern ones. For this key individuals/families have been introduced with the system and are ready to spread/replicate among others. Thus, Siddhipur was an ideal place to start with this system where, the technology in another form had been in use since ancient times and promises to be a successful one with exemplary community participation and demand driven approach. This pilot project has been successful to demonstrate the system so that it could be multiplied for implementation into other parts of the country.

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