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**WATER, SANITATION AND HYGIENE SERVICES BEYOND 2015:
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**EcoSan: Sustainable solution to sanitation problem
in rural India**
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Despite models being developed in various parts of the country, EcoSan has not succeeded in emerging as a popular model for the communities. The reasons vary between acceptability, affordability of the model and usage of proper IEC/BCC to convince the communities. The success of EcoSan has been confined to demonstrations and experiments. This paper deals with the experiences of WaterAid in developing EcoSan as a sustainable model which can cater to the needs of the larger populations. It explains, how through the innovations in the model, IEC and demonstrations, EcoSan can be made culturally and economically acceptable to the community.

Introduction

Ecological sanitation, EcoSan is an innovative approach for promotion of sanitation and hygiene. It is based on a strong foundation of behaviour change of local communities. The basic concept of EcoSan toilet is to manage human faeces and urine by decomposing them before disposing into useful organic resources, which can be handled safely and used in agriculture without harming our environment. Structurally EcoSan toilets consist of two pits (one for use and one for composting alternatively) and a urine and wash water diversion outlet. Usually, a pit is designed to suffice for a five-member family for 10-12 months, after which the second pit is used and excreta in the first pit (rich in potash and nitrogen) is left to decompose. After every toilet use, a handful of ash has to be thrown over excreta to create optimum conditions for waste decomposition by microorganisms into nutrient rich fertilizer. Urine and waste water (rich in ammonia) collected in a separate container can be diluted and used for kitchen gardens, horticulture units, floriculture etc. In this paper the term EcoSan has been used for Urine diversion dry toilets.

Experiment with EcoSan

WaterAid has been successfully experimenting with various technologies which can cater to the area specific needs of communities. One such effort is in progress in Korba district of Chhattisgarh. Geographically some parts of the district have high water table thus often imposing risk of failure of leach pit toilets. The possibilities of introducing ECOSAN toilets in these areas was then explored. The initial intervention was limited to a handful of families in one village Dhodhipara in Pali Block of Korba district, which has later been extended.

EcoSan toilet is an alternative to leach pit toilets for water scarce places or where water table is high posing risks to ground water contamination. In this toilet, the user needs just enough water for cleaning as much is needed in open defecation. These toilets have been based on the principles of recovery and



**Figure 1. Status of Leach pit
in rainy season where water table is high**

Source: WaterAid India.
The Struggle and Successes

recycling of nutrients from excreta and creating valuable resource for agriculture.

After successful demonstration in one village, the acceptance of the technology has increased and communities have demanded for the construction of such toilets in 10 different villages of Korba. The acceptance is also visible by the fact, that people have borne up to 40% (INR 4500/- USD 71/- of the cost of construction. If we compare this with the contribution the community readily agrees for construction of leach pit toilets, promoted by the Government; it stands less than 10%.

Innovating the model

EcoSan model has been very successful in pilots and demonstrations however it has failed to be accepted by the larger community as a result of which it could never be scaled up. Construction cost of standard leach pit toilet is always less than the standard EcoSan toilet. Higher cost of the toilet always acts as the first hindrance for to be accepted by the people. Again, there are many other factors like utility of the toilet. EcoSan toilets have specific methods of usage and minimal water use which is completely opposite to the leach pit toilet usage. Unless properly explained to the communities, it is difficult for them use EcoSan toilets. Hence, a lot of perseverance is required for sustained community education and awareness on using these toilets.

All these factors were addressed by WaterAid while introducing the concept of these toilets in Korba. The first challenge was to bring down the cost of construction of the toilet. Initially eco-squatting pans of polyfibre (shown in photograph 1) were used for the eco san toilets. These pans were not available in Chhattisgarh and had to be purchased from other State. This increased the unit costs of the complete structure comprising of the pit, pan and Superstructure initially stood around Rs 16,000/- (USD 254/-) per unit. This unit cost proved to be unviable as it was difficult to get support from the Swatch Bharat Abhiyan which provides a support of Rs 12,000/- (USD 190/-) for construction of household toilets. To ensure the sustainability of these toilets it was thus important to reduce the unit cost. Thus, instead of procuring the traditional poly-fiber pans, the masons were trained to construct the floor of the toilets as eco san pans.



Photograph 1. The Standard Eco San Toilets

Source: WaterAid India



Photograph 2. Locally modified toilet

Source: WaterAid India

This in-situ construction reduced the cost of the unit considerably. **The cost of the unit shown here is only Rs 12000/- (USD 190/-)**. This is approximately the same cost as being promoted by Swatch Bharat Mission, the national flagship programme on sanitation. This can be further brought down by reducing the size of the pit, making the super structure using locally available material (like bamboo) or making thinner walls to the super structure. This is shown in the Photograph 2.

The rural areas in Chhattisgarh, water is not readily available nearby and has to be carried from distances by women folk. Water being the scarce and costly resource is given priority for drinking, cooking and washing and last for cleaning of toilets. This often led to discontinuation in usage of the leach pit toilets as it requires water for cleaning of the pans. Here it was explained to the communities how EcoSan required less water for maintenance.

The usage of EcoSan is different but continued orientation of the people helped in removing their mental barriers in adopting this. The community with whom EcoSan was being introduced, is habitual to open defecation. For them the usual concept of toilet is that water is used for washing at the same place. The concept of not using water in the squatting hole, covering it with ashes after every use appears weird to them. To put them in the habit of using the toilets in the designated manner, continuous education and monitoring of the families was maintained in the village. Another issue which proved to be a barrier for the community was the collection of urine. Initially, we did not ask the community to collect the urine and a separate soak pit was built for it. Gradually, the importance of the urine, its high nitrogen content and usefulness in plant growth was communicated to the people. This helped in convincing a few farmers practicing horticulture to start collecting urine and others soon followed. All of them have kitchen garden and they are using urine in the same.

The most important step here was constant contact with the people to check that they are using the toilets in proper manner. After a while it forms a part of their routine.

Use of manure and urine The use of EcoSan manure for kitchen gardens, horticulture units and agriculture was also demonstrated to communities as a part of the additional benefits of the toilet. As the pit of EcoSan gets filled, it is closed and sealed. After around 10-12 months, the faeces gets composted to manure and can be used in farms. Photographs 3 and 4 below show how these are used in farm. Photograph 3 is showing the pit opened after 12 months. The faeces is totally composted and has been converted into organic manure. While the first pit is closed, the second pit is being used.

The compost can be safely handled as it is devoid of any pathogen (Photograph 4). Photograph 5 shows a farmer using the compost in his farm. 6 horticulture units of Banana are using urine as fertilizers (Photographs 6).

The recurring benefit of the toilet in form of manure appealed to the people which can be ascertained from the fact that they are ready to bear 40% of the construction cost of the toilets. They are also decorating the walls of the toilets to improve its aesthetics and this also reflects their acceptance of the toilet.



Photograph 3. Pit opened after 8 months

Source: WaterAid India



Photograph 4. The manure can be safely handled as it does not have any pathogens left in it

Source: WaterAid India

Why EcoSan is acceptable?

EcoSan has many benefits over the leach pit toilet. Convincing the community on the benefits of EcoSan toilets required innovative IEC/BCC. Constant contact and follow up with the community helped in removing any mental barrier they had in accepting this toilet which worked on new methodologies. The utility of the toilet was depicted through wall mural in the villages. A short documentary film was made on EcoSan, its utility and benefits. The movie was shared with the community. Demonstration of use of EcoSan manure on paddy crop and use of urine on horticulture units have been carried out. This helped to create an interest of the community about the toilet.



Photograph 5. The organic manure is being used in the farm as economically viable organic manure

Source: WaterAid India



Photograph 6. Urine collected from EcoSan toilets being used in Banana plantation as fertilizer

Source: WaterAid India



Photograph 7. Spacious EcoSan Unit

Source: WaterAid India



Photograph 8. Crampy Leach Pit Toilet

Source: WaterAid India

Most of the factors described in the above table lead to non-usage of the leach pit toilets in the long run. In rural areas water is not readily available and most of the time has to be carried from long distances mostly by the women folk. Since leach pit toilets require considerable amount of water for flushing, cleaning and maintenance, after some time usage is often discontinued. Absence of proper maintenance leads to foul odour and other factors like space crunch also play crucial role in abandonment of the toilets. A glance at the above table makes it very clear how EcoSan toilets addresses these hindering factors. They require no or minimal water, minimum maintenance as they are devoid of pans and are spacious and odourless. Hence, it becomes easier to convince a community to use these toilets.

Table 1. Advantage of EcoSan toilet over conventional pour flus Leach pit toilet		
Comparison feature	EcoSan Toilet	Pour Flus Leach Pit Toilet
Space	Due to two squatting pans, the inside space of the toilet is larger making it airy and less stifling. (Photograph 7)	To bring down the cost of construction, the superstructure is constructed with optimum size of one squatting pan for the toilets promoted under Government schemes. This makes the toilets cramped and uncomfortable (Photograph 8)
Requirement of water and maintenance	As flushing is not required, the water requirement is minimal and same as required in open defecation. Since the squatting pan doesn't get dirty with stains it appears visually clean and people are ready to use it and there is no foul odour. It requires other maintenance like use of ash which is readily available in rural households and also the by products are being put into use at household level like urine for kitchen garden.	Much water is needed for flushing the toilet after every use and the pan needs to be cleaned regularly. In rural Chhattisgarh, it is not cleaned and the pan gets dirty and due to foul odour it has been found people discontinue using it.
Cost	With some modification and choice of material of super structure, the cost is at par with the twin pit leach toilet. It can be adapted to community budget. It is easy to convince households on points of cost recovery as the latter is done in three phases and not at the end of crop harvesting. Cost recovery is obtained immediately from the use of urine in the kitchen garden followed by recovery from use of manure in the agriculture field (saving the cost of purchasing fertilizer) and lastly from the increased yield of crops.	Can be cheaper but there is no cost recovery.
Ecological	Close loop/ circular flow There is decrease in contamination of ground and surface water with pathogens from human excreta.	Open loop/ linear flow In many areas where the water table is high, pit latrines directly pollute the water table, potentially affecting the large numbers of people.
Soil fertility and agriculture	Preservation of soil fertility, improvement of agricultural productivity and food security. Manure is available after every 6-8 months and urine is available on regular basis. Urine is stored for 1 month and then used. It is used mainly in the kitchen gardens, which are maintained throughout the year. Also, there are farmers having horticulture units in the same village, who collect the excess urine from the households. Promotion of safe, hygienic recovery and use of nutrients (nitrogen and phosphorus), organics & trace elements. By properly managing urine fertilizer costs can be reduced. Less need for commercial fertilizers.	Provides matured sludge which is rich in nutrients but available after every 2-3 years.
Geographical suitability	EcoSan toilets can fit in all kinds of geographical locations- rocky soils, high water table areas, alluvial soils, arid regions etc.	In order for the pits to drain properly, the soil must have a good absorptive capacity; clay, tightly packed or rocky soils are not appropriate. This technology is not suitable for areas with a high groundwater table or where there is frequent flooding.

Apart from high water table areas, EcoSan was introduced in hard rock and water scarce regions also. The results of the above action plan yielded very positive response in form of demand for construction of EcoSan toilets from the community. In Dodhipara village WaterAid had constructed toilets for 62 families, rest 70 families of the village have applied to the District Administration for construction of EcoSan toilets for them. After this, 20 EcoSan toilets were constructed in hard rock and water scarce areas in 11 different villages from Chhattisgarh and Madhya Pradesh State. These toilets have shown 100% usage, where the traditional toilets have failed and demand is coming for construction of more toilets. Since, now these toilets can be financially accommodated under the provisions of the Swachh Bharat Mission and the rising acceptability of the toilet amongst the community, it can be expanded in the larger community.

Conclusion

Ecological Sanitation or EcoSan is a safe, environmentally and economically sustainable approach to sanitation. It is especially relevant to rural areas where water has to be fetched from far places to houses. Its three basic principles- prevention of pollution, sanitizing urine and faeces for recycling and safely using nutrients found in human excreta for agriculture and horticulture along with less water requirement, more space and less maintenance makes it appropriate option for everywhere. The model of EcoSan described in this paper is economically feasible and proves sustainable as it can be built within the incentive provided in the Swachh Bharat Abhiyaan, the flagship programme of the Government of India. In rural scenario it is economically attractive because it provides organic fertiliser and humus for nourishing poor soils. These EcoSan toilets do not smell and can be modern and up-market. Since, it is suitable for construction in various geographic locations and its usage is also high, policy level interventions for large scale construction of EcoSan toilets under the flagship programme will help in meeting the problem of open defecation in rural areas.

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