Where softness matters most: Scaling up dry toilet programmes in developing countries

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INTRODUCTION

Historically, the productive use of human excreta is not new. At the end of the 19th century, the city of Groningen in the Netherlands earned 50,000 guilders (one guilder per inhabitant per year) with the collection of human faeces which were disposed in bucket toilets (Noort, 1990). The contents were sold to small farmers in the neighbouring province of Drenthe to enrich the poor sandy soils of the area. The productive use of urine was also known. In many Dutch towns, the inhabitants sold their urine to the local textile industry to be used for the washing and bleaching of wool and the production of felt. Rotten urine was also used in the leather industry. The story goes that in one city no urine was sold on Mondays because it contained too much alcohol which stopped the conversion process. Well-known is also the story of the emperor Vespasianus (Rome, 69-79 BC) who levied tax on the sale of urine for the production of wool and leather under the adagio *Pecunia non olet* (money does not stink).

Today, the productive use of human faeces and urine has revived in safer and more convenient forms. An increasing number of environmentalists and water and sanitation sector workers are coming to see such uses as part of, and for some the solution for the water supply, sanitation and hygiene (WASH) sector in the North and the South. They point out that eco-sanitation prevents pollution and diseases caused by human excreta. Eco-sanitation sees human excreta as a resource rather than a waste product, which allows the recovery, recycling and use of NPK nutrients (Nitrogen, Phosphorus and Kalium or in English Potassium) as a valuable natural fertilizer. The need for an alternative source of phosphorous production is especially high, since with the expected increasing demand the current supply may be depleted in the next 30 years (Geurts, 2006).

However, not all are convinced that dry toilets should be widely used. In his defence of the right of the third world to flush toilets, Ceri Dingle of the British education NGO Worldwrite said: “The preoccupation with dry toilets is …an anti-human prejudice based on complete panics and irrational fears about planetary water shortages”. Dennis Avery, director of global food issues at the Hudson Institute is also a defender of the modern flush toilet. “It’s one of the greatest public health advances in the modern era. It’s not only convenient, but it is also safer” (Dingle in Morano, 2003). He stresses especially the public benefits from the lower incidence of diseases such as cholera and typhoid. Resistance from potential users is another constraint. Users do not like to see excreta and find it hard to believe that they will get safe compost (Smet and Sugden, 2006). In an early experiment with composting toilets by Uno Winblad in Morogoro,

Tanzania, users mentioned that those collecting excreta in Morogoro town always wore gloves when handling excreta. They expressed a fear that when deposited on their land, the compost would burn their crops.

LARGER PROGRAMMES

Despite such criticism eco-sanitation increasingly flourishes on the ground, but those that report that people use and like ecosan concern mainly research, pilot and small-scale projects led by an enthusiastic person or organization (e.g. Abbott, 2004, Austin and van Vuuren, 1999, Boom, 2003, Breslin, 2000, EPHO, 2006, Jackson, 2005; Manandhar et al., 2004, Sugden, 2003; Terrefe and Edström, 1999, WASTE, 2006). In only a few countries has ecological sanitation been taken up in large-scale programmes. Although there are also interesting programmes in the North, this paper focuses on the South since large numbers of people have not yet got sanitary provisions and dry toilets are competitive to sewerage programmes. Foremost are Vietnam, Mexico, China and Southern Africa (with national policies in South Africa and Uganda).

Vietnam is the classical country for the composting of excreta and their use in agriculture. By 1972, ten years after the launch of a Five-Year-Plan for water and sanitation there was on average one composting toilet for every 1.4 households in the North Vietnam area where the Plan was initiated (Hurtado, 2005). However, there was also a high wormload as farmers put manure onto their fields that had not been stored long enough (Shordt, pers. com.). It appears that this practice has now changed thanks to more hygiene education (Winblad and Simpson-Hébert, 2004).

In Mexico, Ana Cordova (2001) investigated the largest-scale and most recent ecosan programmes in urban areas. She found that “in several programs, after 2-5 years, the technical support to users had discontinued completely, or had decreased significantly”. Moreover, “in most cases, the receiving population did not participate as a group in the decision to introduce dry toilets in their community, nor did they participate later in discussing the problems that arose or in seeking solutions” (p. 6). In a study on user satisfaction in five cities, with a total of 1157 dry toilets, Cordova and Knuth found that user satisfaction nevertheless averaged 8.7 on a scale of 1 (low) to 10 (high), except for the city of Leon (score 5.5). Here, users had not chosen themselves to install dry toilets, as the toilet came with the house. There had also been relatively little awareness building and training. Users complained of bad odours, excessive humidity and too much work. While the users in the other cities all thought their new toilets better than their previous ones, those in Leon preferred their old conventional toilets. Strategically, gradual diffusion over a longer period had worked equally well as large institutional programmes and with different types of dry toilets, provided users had had an informed choice, were aware of purported benefits and had a good follow-up and support system (Cordova and Knuth, 2005a).

Also in Mexico, Clark (2001) observed that “when attempted on a relatively large scale, implementation continues to be hampered by inadequate community education, training, and participation in decision-making” (p. 1). She reports on a programme in five regions where community groups and civic organizations had requested dry toilets. In each region,

a regional promoter was trained in construction and maintenance, popular education and gender issues. These promoters trained community promoters and helped communities to develop their own projects. Each project had its own champions, from a political party leader who promoted dry sanitation after being elected, to a coffee growers' cooperative which wanted to prevent water pollution and obtain organic fertilizer, and a local NGO which trained its women health promoters on improving the operation and maintenance of dry toilets and promoting new construction in other villages. The central NGO also helped promoters to set up their own shops to produce and sell the dry toilets seats. However, "despite identifying key elements for successful projects, progress was slow, demonstrating that this model alone will not result in large-scale implementation" (p. 5).

In Southern Africa, the largest scale development is in South Africa, although there are also a substantive number in some other East and Southern African countries (Table 1). In South Africa, over 13,000 dry toilets have been installed in rural areas. The largest programme is in the province of Northern Cape, South Africa, where households could choose between flush toilets, ventilated pit (VIP) toilets, hybrid aqua toilets[1], and eco-toilets. A large programme is further being carried out in the Greater Durban metropolitan area (now called eThekwini) as part of the South African Government's free basic sanitation campaign. This programme focuses on dry toilets only. At least 20,000 urine diverting toilets have hare been installed at a rate of 1,000 per month. Allegedly, the programme struggles with the same issues as those of other top-down heavily subsidized sanitation projects (e.g., not properly used, or not used at all) (Jackson, 2005).

Table 1. Number of ecosan toilets built in Eastern and Southern Africa by 2005.

Country	# built	Agencies	Source
Malawi	3500+	WaterAid, CCAP, COMWASH	Morgan, 2005
Mozambique	900+	WaterAid, PAARSS	Morgan, 2005
S.Africa	33.000+	Government of South Africa	Morgan, 2005
Tanzania	10,301[1)]	UNICEF, EEPCO	Jackson, 2005
Uganda	750+	Ministry of Water, Lands and Environment	Jackson, 2005
Zimbabwe	1947	Mvuramanzi, Eco-Ed Trust	Jackson, 2005 Morgan, 2005

[1)] 10,000 toilets are not dry toilets, but double-vault ventilated composting toilets built with UNICEF support in the 1980s. They need two years of composting to fully process excreta.

The recommendations from a visiting expert spelled out the level of effort required to achieve proper use of the toilets: "During the first year, people must be supported far more with user education. The chambers must be opened far more regularly, with the householder, and mistakes pointed out [e.g. too much liquid, non-degradable material, etc]. In particular the householder needs to understand the importance of using dry soil to aid the desiccation process. They also need to be supported with the composting

[1] Hybrid aqua toilets are a hybrid between a VIP and a full water-borne system. The flush water flows into a separate pit from the one housing the solid waste. Trees are planted above the pit collecting the water so that dispersal takes place more easily

process as this is virtually unknown in South Africa and they need to be shown how the natural processes render the faeces harmless." (Jackson, 2005, p. 11).

Both the Department of Water Affairs and Forestry (DWAF) and the South African Local Government Association (SALGA) have made the provision of safe sanitation one of its priorities for the coming ten years. Funding also comes from the Department of Housing and Local Government. The subsidy for sanitation is R 1200 or US$ 163 per household. DWAF has the triple role of providing policy for the sector as a whole, monitoring the provision of installations and regulating the sector. The department provides guidelines on the subsidy, conducts health and hygiene awareness campaigns, and ensures that service delivery is appropriate, acceptable and affordable. Members of the communities have been trained as builders. A health and hygiene programme has also been instituted and local people have been trained as health and hygiene workers (DWAF, 2002, Government of South Africa 2004a, b).

Uganda began to support dry toilets in 1997 as part of several options (both dry and wet toilets). Dry toilet models were especially promoted in areas with unstable or rocky soils or a high water table. By May 2003, 506 dry toilets had been built and 52 more had been constructed privately (Jackson, 2005). In February 2003, the Environmental Health Division of the Ministry of Health published a national strategy and an operational plan to promote ecological sanitation in Uganda (MoH, 2003a, 2003b). The strategy aims at creating widespread demand for dry toilets, especially in areas not suitable for other toilet options, through public media, meetings and the construction of demonstration units. Each region is to get an implementation coordination team to carry out training for every district. In each region, local suppliers and contractors will be trained to offer dry toilets, with an initial subsidy of 50%. The strategy should result in larger-scale projects at regional/district level in which the private sector is lastingly involved in promotion and construction. Each region is also to have a follow-up and monitoring programme, share experiences and evaluate the work. A special eco-san fund has been proposed to fund training, exchange visits, awareness creation and construction.

The greatest reported progress in eco-sanitation comes from China. Here a small pilot with 70 households in Guangxi province has now spread to a total of 685,000 households in 17 provinces (WASTE, 2006). An important factor in the uptake was the habit of the population to urinate and defecate while standing on blocks. The urine soaked into the soil and the faeces which stayed behind were later collected as (unsafe) manure for the land. The new toilet designs have the advantages of the old system but not the bad smell and the flies and are clean and small enough to be located inside the houses. Another important reason for the success was the central political system which allowed rapid expansion through a campaign. With top-down decision making the accepted mode of operation, expansion of the officially accepted dry toilet model could proceed quickly once the decision-makers (the Ministry of Health, the provincial Public Health Campaign Committee, the Institute of Environmental Health and Engineering and the Jui San Society) had been convinced (Jurga et al., 2005). In the first year 2,000 more toilets were built. In the second year this figure had risen to 8,000 and the third year to 30,000. Key to the expansion is the construction of a model toilet in one household and the establishment and training of core teams at the provincial, county and

village level. Team members come from the government departments of sanitation, construction, education and information and from the National Women's Union. The county team coordinates all ecosan work and monitors the speed and quality of the construction work (Lin, 2002).

These achievements, while encouraging, hardly make a difference in the light of the predicted continuation of the sanitation gap. Expectations of the WHO are that by 2015 there will still be over two billion people who have no improved sanitation (WHO, 2004). If it is already so difficult to achieve that people install and hygienically use any kind of improved toilets, it may not be realistic to expect that eco-sanitation will spread widely and rapidly, seen its newness, costliness and complexity to use and maintain. Questions that present themselves when considering to scale up eco-sanitation concern costs, financing, demand creation, user choice, delivery systems and follow-up and support.

CAN DRY TOILETS BECOME CHEAPER?

To compete with other models and be adopted on a large scale, the cost of dry toilets cannot differ too much from other on-site models. This is not a given at present. Lenton and Wright (2005) place the cost per person for ecological sanitation between a septic tank at US$ 160 and a sewer connection with local labour at US$ 140 (Fig. 1). Assuming a five- person household and a cost per person of US$ 150, this would bring the unit costs to US $ 750 per household. In other reports, the costs of dry toilets are sometimes higher (up to US $1150), but the majority is considerably cheaper, with unit costs ranging from US$ 1150 for a fibreglass model with riser and seat in Mexico to US$ 5-15 for the arbor loo in Malawi and Zimbabwe (Table 2). If an extra 15% is added for operation and maintenance costs, prices would range from US $ 1223 to US$ 7-17 per household. While much cheaper than any sewerage programme, for the poorest the costs of most models are still quite high.

Ongoing research, including action research with the users themselves could however lead to considerable cost reductions. In Pulluvilla, Kerala, for example, action research with the women's group and the ecosan promoters of a local NGO resulted in a unit price of Rs. 3500 or US $ 75, 44% of the initial cost of Rs. 8000 or US $ 171 (Calvert, 1997).

An additional issue is that the cost of virtually all these toilets has been given without specification. This makes comparison hardly possible; also considering the significant price level differences of hardware in different countries and continents. Assumed is that they all concern a full unit, with under- and upperparts and labour costs for digging the pits and constructing the toilet, but without costs of operation and maintenance and the indirect costs of community mobilization, participation, training and follow-up.

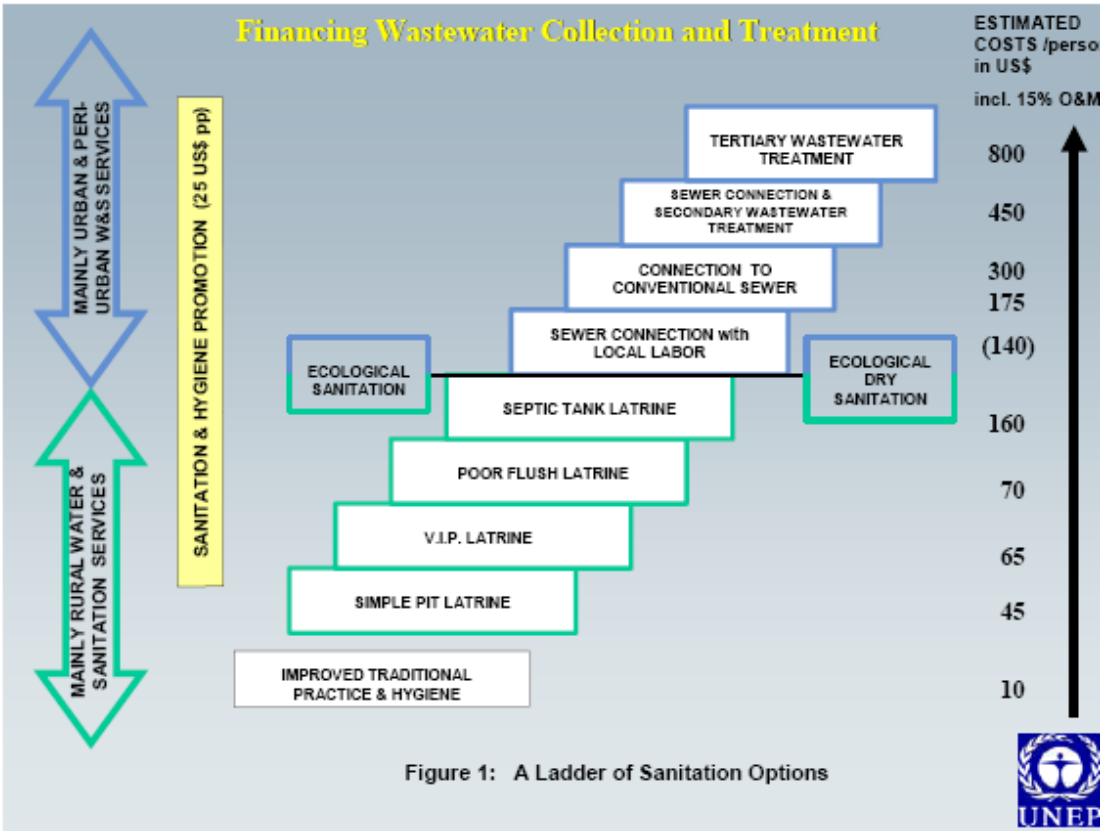

Figure 1. Financing wastewater collection and treatment. (Source: Lenton and Wright, 2004. Adapted from van der Guchte and van der Weerd, 2004 and Mara, 2004)

Table 2. Capital cost, cost-sharing and user income in dry toilet projects in countries.

Unit costs in US $	Model	User Share	User income	Country	Author	Year
5-15 (+ slab @ US$ 2	Arbor loo	All costs except slab	Low	Malawi, Zimbabwe	Jackson, NWP	2005, 2006
9-11	Dry, urine diversion	Not specified	Low	Mozambique, Niger	Lapid NWP	2005 2006
14-40	Dry, urine diversion	Labour, roof, walls, 2 plastic drums	Low	Philippines	NWP	2005, 2006
20-30	Fossa Alterna	Labour	Low	Ethiopia + other countries	WSP, NWP	2006, 2005
35	DVUD*	100% subsidy		China	Winblad et al.	2004
46-105	DVUD*	Not specified	Not specified	Mexico	Winblad et al.	2004
100	Dry toilet + Eco-lily	100% subsidy	Low	Ethiopia	WSP	2005
60	DVUD*	Not specified	Low	Zambia	Mayumbelo	2006
60-400	Skyloo	Not specified	Unspecified	Uganda	Jackson	2005
80-150	DVUD*	Not specified	Low	Kerala, India	Winblad et al.	2004
80-250	DVUD*	Av. US$ 113	Low	Tanzania	Jackson	2005
215	DVUD*	50% subsidy	Not specified	Nepal	Manandhar et al.	2004
306	DVUD*	Not specified	(Very) low	Mexico	Beaudoin & Cuéllar	2005
400	Dry toilet	100% subsidy	Not specified	Various	Farley & Kilbey	1999
450	SIRDO†	100% subsidy	(Very) low	Mexico	Cordova[#]	1999
480	SES-Aca**	Roof, door	(Very) low	Mexico	Cordova[#]	1997
520	SES-Cuer	All costs	Low, Middle, High	Mexico	Cordova[#]	2001
700-1000	Dry toilet with UD	60-80% subsidy	Not specified	Palestine	Winblad	2002
1,100	Nahi Xix‡	Walls, Roof, Door	Very low	Mexico	Cordova[#]	1999
1,100	Nahi Xix‡	All costs, for poor subsidy	Low, Middle, High	Mexico	Cordova[#]	1999

* Double vault urine diversion † Sistema Integral de Reciclamento de Desechos Orgánicos or Integral System for Organic Waste Recycling **Sanitario Ecológico Seco or Dry Ecological Toilet [#] year of publication 2001. ‡ Adjustment of Swedish Clivius Multrum model

SUBSIDIES FOR SUPPORT, NOT TOILETS

If dry toilets are to be installed on a large scale, at least the direct costs of the under- and upper ground parts will have to be largely covered by the users. Otherwise the direct and indirect costs will become so high that they are unlikely to be paid on a large scale and for a considerable time by governments, NGOs and/or external support agencies. If households pay the direct cost, this would still leave substantial indirect costs such as promotion, training, user participation, hygiene education and monitoring of installation, hygienic use, operation and maintenance, all with a gender and poverty lens, for the supporting agencies.

At present there seems to be very little experience with ecosan toilets without a subsidy. The more interesting is it that in the project of Tepotzlan, poor households were among those who have paid the full direct costs of a dry toilet (Cordova, pers.com). So it seems to be possible, but why and how the achievements without subsidy were achieved has so far been unresearched. This is all the more interesting because in 2004, of those without a proper toilet, 633 million people were living below, and 1295 million people above the poverty line (UNDP, 2006). Between 20 and 40% of these poor families can be considered to be chronically poor (Mckay et al., undated).

Experiences in Bangladesh show that it is nevertheless possible to achieve that very poor people install water-based toilets without subsidy when in a participatory process of 3-4 hours they do a transect walk in the defecation areas, map the households without toilet and calculate the excreta load in their environment of land and water (Kar, 2003).

It may be therefore argued that at least those families without proper toilets that live above the poverty line install a model of eco-sanitation if they have sufficient reasons to do so. And even those living below the poverty line may be able to afford an ecosan such as the Arbor loo of Southern Africa or the tyre toilets in Sri Lanka.

A common fear is that excluding or withdrawing direct subsidies may hit the poorest households in the community most of all. However, it can be doubted whether in reality such subsidies actually benefit the core poor. They are often the last to hear of subsidies and may be unable to use them as they lack the space, transport or the other resources to install a toilet (Kar, 2003, Wijk, 1998).

A way out in such cases is to identify and locate the hard core poor households with the help of the Participatory Rapid Appraisal welfare assessment and social mapping tools (see e.g. AWARD/NRI, 2004, Mukherjee and van Wijk, 2003). It then becomes easier to have a discussion with the community leadership on why such households are served least and what this means for the community's dignity and public health. Besides allowing better targeting of subsidies, these exercises have made villagers decide that they themselves would solve the situation by helping families that lack physical and financial resources, such as the old, infirm and female-headed households with young children, to build a simple toilet in their yard (Sari, 2003).

SURFACING, CREATING AND MEETING DEMANDS

Dry toilets do not differ from any other product in that people must want them and be able to obtain them in a form they like and can use, at a place they can access and at a cost that they want and can pay. A working group on sanitation identified already nine reasons why toilets in general are not taken up on a sufficiently large scale (WHO, 1994). These problems count even more for eco-sanitation which is less known and often more complex to explain, construct, operate and maintain than other on-site toilets.

A demand for such toilets needs therefore to be created, or an existing demand surfaced, accepted and acted on. For creating a demand, one needs to know or find out which factors stimulate the installation of a toilet as such and then why people from the many possible toilets would choose for (a special type of) eco-toilets. Reasons for wanting sanitation are not so much health as convenience, privacy and safety for women, and status. Eco-toilets seem to be most acceptable in areas where the high water table or rocky soil prevent the installation of other types of on-site toilets, and because of a demand for cheap compost that can locally be used in agriculture or horticulture (Calvert et al, 2002, Jurga et al., 2005, Sugden, 2003). There are also indications that households want to install toilets as part of whole bathrooms, ranging from a wall-surrounded area with drainage where people can bath by pouring water over themselves (Wijk & Nibakure, 1996) to bathrooms equipped with showers and ceramic toilets (Cordova and Knuth, 2005a)

A hidden demand is often present among women, who have the greatest problems in maintaining privacy and safety for excreta disposal. From an adolescent age onward, they have to find places where they have sufficient cover, often going there in hours of darkness, and facing risks of safety when going out alone. It is therefore not surprising that women want toilets first of all for themselves. Getting heard and answered is another matter, as long as it is more difficult for them to attend and speak out in public meetings and getting male engineers and politicians to take up a subject that is not glamorous and does not offer much career opportunities or a large number of votes. Bringing this hidden demand to the surface is therefore an essential part of any programme, while the modernity of dry toilets and their lower cost than sewers can an entry point to make dry toilets attractive for professionals and politicians.

Mass media, both modern and traditional, are an appropriate means to reach and inform many people in relatively short periods. To reach the different target groups at the different levels, customization is required to make sure that each group is addressed through the channel or channels and with a message or messages that are most appropriate for that group. Even so, person-to-person contacts are needed for these messages to take effect (Curtis and Kanki, 1998). Hence contacts with promoters, producers, peers and other potentially influential people must complement the mass approach.

One interesting group for personal contacts are female masons that can build toilets. Women have proven to be very effective toilet builders within their own environment for a number of reasons. First, toilets constitute a universal need among women, and

women therefore have a greater interest in specialising as toilet builders than men. Second, women can far less easily travel for work outside their direct environment than men, tied as they are by culture and children. Opportunities for women to get gainful employment within their own environment are therefore much appreciated and women will do their utmost to deliver a product that is appreciated by their fellow-women and likely to lead to further work through the women's chain. Local women were first doubtful whether women masons could install toilets as well as men, but seeing their work and liking the neater plastering did away with these doubts (Mathew, pers. com.). Third, women can more easily contact other women to discuss sanitation and inform them on the costs and characteristics of the various models. Regular sanitation programmes in Lesotho and Kerala, India, have trained and prepared large numbers of women to become self-employed toilet masons (Blackett, 1990; IRC, 2004. Wijk et al., 2002). These continuous, large-scale delivery systems for simple pit and double-vault pour-flush toilets are also suitable for the budding dry toilet market.

INFORMED CHOICES

In 1997, a team in Laos developed and used a sanitation ladder. It consisted of drawings on cards of each type of possible toilets, complemented with drawings of the different materials that could be used for their construction. The cards had also general information on the cost of the different materials. In meetings, the villagers were helped to sort the cards into a sanitation ladder from the cheapest to the most expensive model and to cost and choose the kind of individual options that they wanted and could afford (Maniphousay et al., 2000). For the first time, this material and the gender and poverty sensitive guidance process (meetings were separate with women and men, and tribal groups) made it possible for literate and non-literate women and men from different socio-economic strata to make informed choices for themselves and their families.
Working in the same vein, and after adding options of DVUDs, the ladder has also been sorted on models that are less and more productive and environmental friendly. While this sorting obviously has great benefits for participatory and gender and poverty conscious decision making, the process also asks for considerable time in training and application. Inputs can be more specific when the sanitation programme has tested and costed the different models in a representative selection of areas and has then chosen the most popular models for wider replication. The advantages of this strategy should be seen against the disadvantages of having a lower degree in participation for technology choice and designs. In both cases, it deserves consideration to carefully cost the local construction of the different models with participation from the users. This process has led for example to getting better quality bricks against lower costs than when the programme would have had to acquire them.

Follow-up on operation and use

As with conventional toilets, the proof of the pudding is in the eating, in this case the proper operation and hygienic use of the dry toilet by all family members. This is by no means automatic. Users, including the young and the elderly, have to get used to put

urine and stools in different places (which physically is not always easy, e.g. in cases of sickness, progressing age and for small children), clean pans with little or no water, learn to add ashes, soil or saw dust, sometimes stir or turn excreta to speed up drying, withdraw urine and properly digested compost and apply them to crops, ornamentals, trees or other plants of their choice. This is harder when there has been little or no user participation and there is no follow up on operation and use (Boom, 2003; Clarc, 2001; Cordova, 2001; Cordova and Knuth, 2005a, b). Experiencing the benefits of compost utilization seems also necessary before people are ready to put urine and compost on plants (Jackson, 2005; Sugden, 2003).

As dry toilets need more user work and oversight than water closets, follow-up of recently installed toilets to check on how the toilet is used is advisable. Little is known on how this is achieved and financed in large-scale programmes, but it might be possible to include some standard follow-up visits for monitoring and advice from the toilet mason as part of the delivered package. In the (non-dry toilet) sanitation programme in Kerala, the local health committees or promoters paid up to three such visits to the owners of recently installed toilets, with the second or third visit made only when the previous visit showed that more guidance was needed.

CONCLUSION: TAKING DRY TOILETS TO SCALE

Since the second half of the last century dry toilets have started their multi-modified spread across the world. Many adjustments have been made and many lessons learned. It seems therefore that the time has come to move beyond another series of research and development and pilot projects into applying the knowledge gained in larger scale programmes. This section focuses on strategies to expand dry sanitation coverage, raise its status and knowledge and plan for comprehensive programmes which reflect socio-economic and gender differences and equally benefit all.

Implosion and explosion

Two strategies that would build on what has been achieved are implosion, or dense coverage of areas particularly suited to dry sanitation, and explosion, or spreading of proven approaches in pilot areas over larger and similar areas with a less dense coverage.

Implosion has a potential in areas where the physical conditions of a high water table, rocky soil and/or a shortage of water are particularly suited for dry sanitation, and there is a good potential for direct use on local land or for other forms of collection and use. Low soil fertility, high fertilizer prices and low farmers' incomes were for example enough to raise the demand for dry toilets among subsistence farmers in Malawi once they had experienced with their own eyes the difference made to their products (Sugden, 2003). Implosion will also contribute to the health benefits of improved sanitation, as coverage levels of 75-80% are needed to get the critical mass for an impact on public health (Esrey, 1994).

Explosion would involve planning and implementing larger programmes in areas where pilots have shown the good potential for a wider spread. Having addressed the

constraints of a range of dry toilet programmes in Mexico, Cordova and Knuth (2005b) suggest a number of steps to address the barriers that hamper such scaling up. A first such step would be to recognize dry sanitation as part of a strategy to close the sanitation gap. It would mean making dry sanitation a mainstreamed and institutionally supported infrastructural option which is widely known and applied. This would not mean that dry toilets will be the single answer to safe sanitation, but rather that it is part of a range of options which are more or less suited to different locations based on their environmental, socio-cultural and economic conditions.

Recognition and knowledge

Such wider application would also involve raising the status of dry sanitation, making it a recognized as a modern technology for rich, middle class and poor households at least in areas that are particularly suited to the technology. This implies also a wider knowledge of the many purposes of a dry sanitation programme: water and energy savings, water quality protection, nutrient recovery and use, economic savings, convenience, privacy and safety to users, low maintenance costs for agencies and better public health. Fears that dry technology will replace too much of conventional sanitation are not warranted as there will remain many parts where conventional sanitation will continue to play its role. In addition, dry sanitation will provide new niches for investment and development as the scale of implementation goes up (Cordova and Knuth, 2005b).

Comprehensive, adjustable programmes

The same authors also warn against over-enthusiastic scaling up from pilots. Larger programmes must be sufficiently comprehensive and include the following elements: toilet model(s) selection, promotion, production, construction and delivery, user training, follow-up and support services, end-product management, evaluation and feedback, and well-planned program management.

Furthermore, strategies are needed to ensure that programmes are adjusted to the different demands, needs and possibilities of the better-off, the middle class and the poor and take into account that women and men in these categories differ in their possibilities for participation, training and evaluation and support. Impacts may also be gender-specific. Sugden (2003) describes for example that one of the reasons for not having a toilet in a rural part of Malawi was that men were unwilling to dig the three meter deep pits. Because the dry toilets needed shallower pits, one of the effects of their introduction was that women took up the pit digging instead of the men, except where the men saw the benefits of the compost for their crops. This clearly points at the need of a gender approach whereby women and men are both addressed on their roles, responsibilities and benefits in sanitation, including for women's vegetable gardens.

Finally it is important to maintain a programme balance between the interaction with users (creating demand, providing training, providing follow-up support), the production capacity (capital, infrastructure, materials) and the organizational capacity to conduct the program (human resources, feedback systems and hardware and software improvement capabilities) (Cordova and Knuth, 2005b).

LEARNING ALLIANCES

All this means a paradigm shift in the ways governments, the international community, NGOs, the educational system and the communities work. Much has been learned from piloting and small-scale projects. Some learning has also come from countries where eco-sanitation has been taken up on a larger scale. The time is now ripe for more collective learning between researchers, development workers, donors, policy makers and private enterprise. This should help useful research reach the poor, get lessons to influence development-related education and help adjust donor and political agendas.

A way of bringing together a range of stakeholders interested in innovation and the creation of new knowledge on a common interest such as dry sanitation is to set up a learning alliance in countries where up scaling can take place. A learning alliance is a series of linked platforms, existing at different institutional levels (national, district, community, etc.), which want the new knowledge be brought to scale (Moriarty et al, 2005). In such platforms, all the different actors are represented that are important for eco-sanitation to be brought to scale in an institutionalized manner: the different community groups, local government, NGOs, researchers and entrepreneurs and actors that have developed knowledge on the ground, the agencies that dealt with implementation at the project/programme level and the agencies that deal with regulation, policy and legislation, education and documentation and dissemination of the technical, social, economic and cultural aspects.

Learning alliances have worked well in agriculture (Lundy & Gottret, 2005), water supply and sanitation, water resources management, animal husbandry, health and policy advocacy. The general outcome has been that learning was shared both horizontally and vertically and that new knowledge has been made part of formal systems (Smits et al., 2005). The lessons from this work can well help in the next stages of the development and application of dry sanitation. To make an impact, it is high time to start large programmes of consolidation and spread in the field, institutions and policies on the basis of what is currently known.

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