

Ecological Sanitation

Social Factors Impacting Use of EcoSan in Rural Indonesia

June 2010

INTRODUCTION: ECOSAN IN INDONESIA

Background

Access to improved sanitation remains a huge challenge in Indonesia. Joint Monitoring Programme (JMP) 2010 data indicate that around 38% of the rural population has access to improved sanitation services and that open defecation remains a widespread practice for over 60 million Indonesians. The persistence of old habits and a lack of awareness form the basis of many challenges in the Indonesian sanitation sector. To change this situation there is a need to focus on changing sanitation and hygiene behavior within communities, in addition to increasing investment in sanitation services.

The majority of Indonesians are Muslims (88%), and Islamic teachings provide instruction and guidance on sanitation habits and behaviors. The teaching requires that running water, if available, should be used for anal cleansing and certain materials, including human excreta and urine, are regarded as *najis* (ritually unclean). Apart from the 'natural' feelings of disgust that most people express towards human excreta which result in anal cleansing, Islam requires ritual cleansing after being in contact with materials that are considered to be *najis*. However, the use of water for anal cleansing also appears to be a cultural habit as non-Muslim Indonesians also use water for anal cleansing, a fact confirmed by the study results.

Objective of the Study

The study objective was to identify the social, religious, cultural and gender-related factors which influence rural people's attitudes towards

urine and excreta-based fertilizers in general and the EcoSan urine diversion system in particular.

Consideration of EcoSan as a Sanitation Option

As Indonesia has a largely wet climate and people use water for anal cleansing, the UDDT (see Box 1) was judged to be less suitable than the UD (see Box 1) toilet. Benefits of urine diversion toilets include reduced odor, no production of fecal sludge that requires disposal, reduced water consumption, and the collection of pure urine for direct use as fertilizer in agriculture. Challenges, on the other hand, include social acceptance of the system (due to the separation of washing water, urine and feces as well as the storage of the excreta), and the collection, processing and use of urine and feces. These are also the factors that distinguish the EcoSan system from most other conventional and low cost toilets systems. This study assumed that these differences may be sensitive for particular religious customs, cultural habits or preferences, as also concluded by Nawab et al. (2006). The sensitivities could include:

- first, that being regarded as *najis*, feces and urine may not be acceptable for the production of food, or that there maybe objections to handling and processing them.
- second, that water should not be used directly above the toilet hole in order to keep the excreta dry. This could be difficult where cleansing with water is a hygienic health-related custom, and even more difficult for those who are required by custom and religious practice to carry out anal cleansing with water.
- third, the urine and feces have to be collected and processed, which requires direct handling by the user if production is to be carried out at household level.

56937

Key findings

- Demand for organic fertilizer exists across religions and regions, with over 80% of both Muslims and Christians responding that the EcoSan system would be beneficial
- Consumer demand is high all across the regions: in total, more than 80% of people are willing to consume products grown using EcoSan compost
- More than 80% of the respondents are willing to use a urine or feces-based fertilizer, but only 40% of farmers would inform their customers about the type of fertilizer used
- Only 50% of respondents were willing to process the urine and feces themselves to make compost
- There is reservation about installing and properly using EcoSan toilet systems. While 70% of the respondents said that constructing the disposal storage above the ground was not a problem, only around 40% considered it easy to keep the disposal hole dry, by not using water for cleansing directly above the toilet
- The use of water for cleansing, where available, is an Indonesian cultural behavior across religions that inhibits the use of a toilet system requiring dry storage

BOX 1: ECOLOGICAL SANITATION (ECOSAN)

The EcoSan concept sees human excreta not as a waste product, but as a valuable resource that can be used for the production of organic fertilizer and/or compost and biogas¹. For human excreta to be used as a resource for fertilizer in agricultural food production, pathogens present in the excreta must be destroyed. There are two main methods of doing this: dehydration and decomposition. Dehydration basically involves removing the air from the excreta with the help of heat or ventilation, or the addition of dry material. In decomposition, pathogens are destroyed through biological processes, with the help of worms and/or bacteria.

Pathogens, however, are not distributed equally in human waste. Most pathogens are in the feces while urine is generally sterile. Urine also contains most of the nutrients, and provided that it is kept pure, after dilution can be directly applied as a fertilizer². Although feces do not contain a high level of nutrients, they are a valuable soil conditioner. After pathogens in the feces are destroyed by dehydration and/or decomposition, the compost is applied to the soil to increase organic matter content, improve water retention, and increase the availability of nutrients and beneficial soil organisms.

Because urine becomes contaminated with pathogens when it has been in contact with feces, a focus of EcoSan technology has been to separate the urine from feces at the point of generation, using toilet pans that collect urine separately from feces. This separation of urine and feces also ensures that the feces are kept dry to enable dehydration to take place. Thus EcoSan technologies can be divided into two types: urine diversion toilets (UD), which use a small amount of flushing water, and the urine diversion dehydration toilets (UDDT), which do not use any flushing water.

Other EcoSan options include the Arborloo, which can be constructed as an offset (or direct) goose-neck pan over a shallow pit latrine. Once the pit is full the superstructure is relocated, the pit is covered with soil and a fruit tree is planted in the covered pit. The fruit trees grow well with the additional nutrients. There are also other technologies that allow (or even require) the combined collection of human excreta that are suitable to use in high altitudes and arid conditions, such as the Andes.

Technical aspects of the EcoSan toilet related to the construction of the toilet, urine separating seat/squatting plate, and storage facilities have been improved and adapted over the last few years. However, as yet the social aspects of EcoSan application and sustainability in different cultural settings have received less attention. These factors form a key part of people's decision making when considering their choice of toilet, and in their motivation to maintain and sustain that toilet without external intervention.

Methodology

EcoSan toilets have not yet been used widely in Indonesia, and their application is limited to technical trials and small pilots. This lack of substantial experience makes it difficult to assess people's real acceptance of, and attitudes towards sustaining EcoSan toilets. With this constraint in mind, the researchers undertook a desk study of socio-economic factors impacting EcoSan in other countries, a market survey assessing producers' and consumers' attitudes towards excreta-based fertilizer, focal group discussions, and community surveys. The result is a qualitative study with some indicative quantitative results.

Given Indonesia's population of 228 million (2008) and its vast range of cultures, religions and local beliefs, ethnic groups and traditional influences, the study does not seek to be a comprehensive reflection of the whole of Indonesia. Instead, it provides a preliminary assessment of attitudes towards EcoSan, and identifies some key drivers and inhibitors which could be used

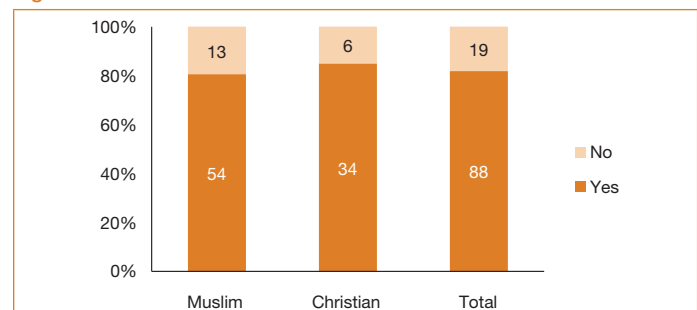
as the basis for improving future pilot projects, selecting pilot locations, and carrying out more detailed research.

Illustration 1: Farmers Using Organic Fertilizers in Ciwidey, West Java

The study was undertaken in eight districts in five provinces across Indonesia. The respondents were 330 women and men, farmers and villagers, and included Muslims, Christians and respondents with traditional beliefs. Four producers and retailers of excreta and urine based fertilizer were also identified and interviewed. However, they were not willing to divulge financial information, which limited the study's ability to undertake the planned economic assessment.

DEMAND FOR ORGANIC FERTILIZER EXISTS ACROSS RELIGIONS AND REGIONS

The most significant evidence for the potential for EcoSan acceptance among the study respondents is that **82% of the respondents believe that the EcoSan system would be beneficial**. The main reason for this can be found in the potential ability to produce fertilizer themselves. More than half of the respondents expect that the EcoSan system would increase their income or reduce their costs, due to self production of fertilizer or increased availability locally of organic fertilizer at lower prices. The high cost and limited availability of chemical and organic (from animal waste) fertilizers, means current fertilizer in Indonesia demand is not entirely met, and any additional supply of fertilizer is regarded as beneficial and responsive to demand.

Figure 1: Is EcoSan Beneficial?

Given this evidence of demand for an additional source of fertilizer, the study researched two aspects related to the potential use of the EcoSan system in Indonesia:

- 1 The **stages of the supply chain** for human excreta-based fertilizers to see if people are willing to deal with the processing and consumption steps, which include storage of excreta, collection, processing to fertilizer, applying the fertilizer to the plants, consuming products

1 The study was unable to research biogas in detail.

2 Usually, one part urine is diluted with 2-5 parts water before application.

grown with human excreta-based fertilizer, and finally, informing their customers that urine and excreta based fertilizers have been used.

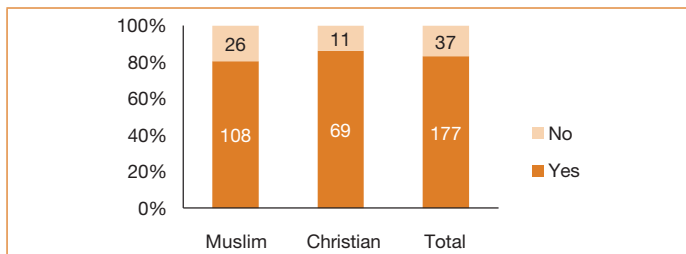
- 2 The **readiness of people to own and use an EcoSan toilet system** correctly. This includes willingness to pay the cost of construction of storage above the ground, to undertake the separation of excreta and urine, to keep the toilet hole dry by not using water directly above it, and to apply odor-reducing materials.

A successful fertilizer market requires that there is consumer demand for the end product: are people willing to consume agricultural products that are grown using human urine or excreta-based fertilizers? The study reveals **that consumer demand is high all across the regions: in total, more than 80% of Christians and Muslims are willing to consume such products.** This positive response indicates that the respondents themselves do not have any concern that the products still contain materials which are considered *najis*, and should therefore not be consumed by Muslims.

BOX 2: IS HUMAN EXCRETA-BASED FERTILIZER NAJIS?

Interviews with the staff of two leading Muslim organizations³ in Jakarta, indicated that there is no specific ruling (*fatwa*) on this issue, and in their view the selling and buying of urine and feces processed as fertilizers and hence valuable substances is allowed. The argument is that the price is charged not for the *najis* itself, but for the human work of processing the *najis*, and for the transportation involved. Thus it is the work of processing and transporting that creates a market value for the urine and excreta. To support this view, several examples already exist in Java of human waste being composted, marketed and successfully sold to farmers through small scale businesses.

Figure 2: Are You Willing to Consume Food Grown Using Human Excreta-Based Fertilizer?



The second most important indication is user demand. The study found that **more than 80% of the respondents are willing to use urine or feces-based fertilizer.** The fact that many of the community respondents are also livestock farmers who are currently using animal excreta as fertilizer supports this result. However, this may also account for their level of comfort with such materials. The majority of farmers interviewed in the community survey (both Muslim and Christian), said that they had not heard of a *fatwa* or any other religious objection to using such fertilizers, and some went on to say they felt such agricultural inputs were socially and environmentally beneficial.

Excreta-based fertilizers are still a sensitive issue for some

Despite the relatively high acceptance of the EcoSan concept and a willingness to consume food grown using urine or composted human excreta, focal group discussions revealed a certain sensitivity of some farmers towards the products. This could be either due to the lack of evidence that it is effective, or due to the direct handling of a product containing *najis* substances, or both. Some respondents stated that their unwillingness to use these products is due not to feelings of shame or disgust, but to doubts about the effectiveness of the fertilizer: if other farmers were using these products successfully, they would also use them. Others, however, explicitly

indicated their feelings of disgust in relation to the processing required, a fact that is supported by another result of the study: **only every second respondent is willing to process the urine and feces themselves.**

Further evidence of this reservation towards the human excreta-based products can be drawn from the finding that even though farmers are willing to consume food grown with human excreta-based fertilizer themselves, most doubt that other consumers would see it the same way: **only 40% of the farmers are willing to inform their customers** that human excreta-based fertilizer or compost has been used in growing their products.

RESERVATIONS ABOUT USING ECOSAN TOILETS

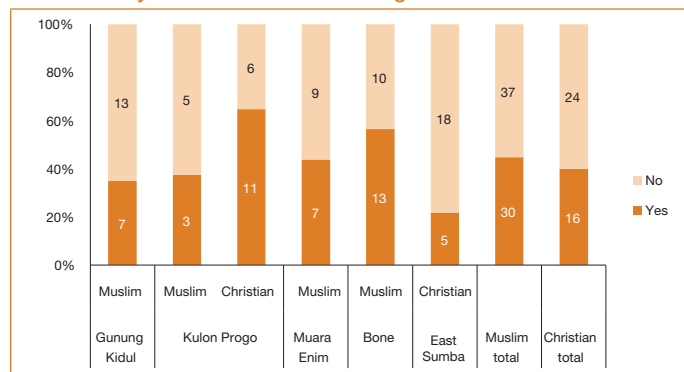
While the results show that people are largely willing to consume products grown with excreta-based fertilizer and to use the fertilizer, the study reveals a greater reservation about installing and properly using EcoSan toilet systems in their homes. While 70% of the respondents said it would be easy to construct the disposal storage above the ground, **only around 40% considered it easy to keep the disposal hole dry**, by not using water for cleansing directly above the toilet.

Illustration 2: A Focus Group Discussion on Community Perspective



The study data show that this is not only a Muslim religious objection, but that Christians also consider it difficult to keep the excreta dry by not using water above the disposal hole. While the percentage of Muslims who considered it difficult to keep the disposal hole dry was fairly constant, the percentage of Christians who felt this way varied from 35% in Kulon Progo, Central Java to 78% in East Sumba. This confirms the assumption that use of water for cleansing, where available, is also an Indonesian cultural behavior that inhibits the use of a toilet system requiring dry storage.

Figure 3: Is It Easy to Keep the Excreta Disposal Hole Dry by Not Using Water Directly Above the Excreta Storage?



3 Nahdlatul Ulama and Muhammadiyah

Gender Differences

A significant difference was identified in the roles and attitudes of men and women towards excreta-based fertilizers and EcoSan. Traditional job divisions in agriculture mean that men generally make decisions about the type of fertilizer to be used (84% men, 16% men and women together) and purchase the fertilizer (62% men, 21% men and women together, 13% women). The only stage where women have more influence is in the application of fertilizer on the land/plants (41% men, 43% men and women together, 12% women, 4% none).

In the household, it is generally the men who make the decision to build a toilet (73%), although it is the women who are first to express the need for a toilet (77%), and they also take an active role in the decision making about which toilet to build. Cleaning the bathroom is mainly a woman's job (53%) or a job that men and women do in turns (34%). Processing urine from EcoSan toilets is perceived to be a man's job (38%) or a man's and woman's job (40%), whereas processing feces is considered to be a man's job by 72% of the respondents.

CONCLUSIONS

The findings of the study allow a range of different conclusions to be drawn for the potential application of EcoSan systems in Indonesia. The most significant driver for EcoSan is that there is demand for organic fertilizer based on human excreta. This is supported by the fact that the large majority of people are willing to consume food grown with the use of human excreta or urine based fertilizer, and that there are people willing to process human excreta to fertilizer and use this excreta based fertilizer on their plants. Religious customs do not appear to have a significant influence either on the use of human-excreta based fertilizer or on the consumption of food grown with human excreta based fertilizer.

Religion alone does not create a significant difference overall in toilet customs and cleansing practices – the use of water in anal cleansing appears to be as much a cultural issue as a religious one.

There are reservations about the use of EcoSan at household level, although the data does indicate potential for general acceptance. This potential may be realized if detailed consumer research is undertaken, followed by carefully designed and tailor-made low-cost EcoSan separating pans that allow people to undertake anal cleansing with water and that dispose of the black water separately to the excreta. Extended awareness and information campaigns would be needed to raise the level of acceptance and awareness, because as currently almost no information about EcoSan is available at local level.

However, there is also potential for private sector and/or community initiatives for the removal and composting of excreta from septic tanks or pit latrines, due to the clearly expressed demand for the product, and the current existence of such businesses. Likewise, an adapted Arborloo may be feasible, where wet pit latrines with gooseneck pans are closed when full and the latrine is relocated.

When addressing the target group for human excreta-based fertilizer and for EcoSan systems, it is important to keep the gender roles in mind. Men generally decide on the type of fertilizer used, while women have a stronger influence in the decision about the type of toilet to be built in the home.

The fact that fertilizer production is the major reason for people to choose the EcoSan sanitation option also leads to the conclusion that EcoSan systems are likely to be harder to promote in urban non-agricultural areas, and would require a completely different marketing and promotion strategy.

References

1. Amguo and Koronadal, Preliminary Report on Contextualizing Sanitation Habits In the Local Culture: Some Considerations for the Implementation of a Sanitation Program, Philippines, 2009
2. Environment Statistical Data 2006-2007
3. Housing and Settlement Statistical Data 2007
4. Hutabarat study, as quoted by Sebastian Eliyas Saragih, Organic Agriculture, Penebar Swadaya, Jakarta 2008
5. Jan Olof Drangert: Norms and Attitudes toward EcoSan System and Other Sanitation Systems, EcoSanRes Programme, 2004
6. Prof. Dr. Koentjaraningrat, Manusia dan Kebudayaan di Indonesia; Djambatan, 1984
7. Statistics of Indonesia, BPS, 2007
8. Steven A Esrey and friends, Ecological Sanitation, Sida 1998
9. Tim Teknis Pembangunan Sanitasi in cooperation with WSP-EAP World Bank, Bisnis Sanitasi: 100 Juta Konsumen Menunggu Anda, 2008
10. Welfare Statistics of Indonesia, 2007
11. WSP Africa, Identifying Demand Drivers for Sanitation Technology: the Case of EcoSan in Africa, 2001

Acknowledgments

The research was carried out by Entin Sriani Muslim assisted by Ana Nurhasanah in 2009. This learning note was co-authored by Martin Albrecht, Isabel Blackett, and Ikabul Arianto and peer reviewed by Eduardo Perez and Jeremy Colin.

Contact us

For more information please visit www.wsp.org or email wspeap@worldbank.org.

The Water and Sanitation Program (WSP) is a multi-donor partnership created in 1978 and administered by the World Bank to support poor people in obtaining affordable, safe, and sustainable access to water and sanitation services. WSP's donors include Australia, Austria, Canada, Denmark, Finland, France, the Bill & Melinda Gates Foundation, Ireland, Luxembourg, Netherlands, Norway, Sweden, Switzerland, United Kingdom, United States, and the World Bank. For more information please visit www.wsp.org.

WSP reports are published to communicate the results of WSP's work to the development community. The boundaries, colors, denominations, and other information shown on any map in this work do not imply any judgment on the part of the World Bank Group concerning the legal status of any territory or the endorsement or acceptance of such boundaries.