

2007

Ecosan Toilets in Tsunami Affected South India-Participatory Action in Development as an Implementation Strategy (x2)

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EcoSan toilets in tsunami affected South India- Participatory Action in
Development as an implementation strategy:

The case of a local Non-Governmental Organization, the Society for
Community Organization and People's Education (SCOPE) in
Kameshwaram, Tamil Nadu.

A Thesis
Presented in
Partial Fulfillment of the
Requirements for the Degree of Masters of Arts

July 2007

by
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Acronyms

MDG	Millennium Development Goals
NGO	Non-governmental Organization
PAD	Participatory Action in Development
PRA	Participatory Rural Appraisal
PHAST	Participatory Hygiene and Sanitation Transformation
SCOPE	Society for Community Organization and People's Education
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Fund
WHO	World Health Organization
VPHP	Village Participation and Health Promoter

Preface

In the summer of 2006, I was an intern with the United Nations Children’s Fund (UNICEF) in India. I was working on an evaluation project titled “The Impact of Link Volunteers on Behavior Change Communication for Hygiene in the Tsunami shelters.” I had become involved with the UNICEF after a Professor at DePaul University had forwarded me information that they were accepting applicants for the summer 2006 internship program. I applied for the internship and was selected to work in the state of Tamil Nadu. I provided the majority of the funding to participate in the program, including airfare and vaccinations, and UNICEF provided me with a stipend to last for the three month duration of the internship. My experience with UNICEF gave me perspective on the development process and the various programs in progress. As part of my fieldwork in the tsunami shelters, I visited the village of Kameshwaram in Nagapattinam District, Tamil Nadu where I first saw an EcoSan toilet. This was the EcoSan toilet that was the pilot project, and I was immediately intrigued to find out more about it. I was initially skeptical about the desire that the community would have for the technology and the ability to transform community members from open defecation to the EcoSan technology. I was additionally concerned with the poor sanitation practices that were visible in the area, including all the tsunami shelters and in other habitations. It was apparent that building a sanitation infrastructure was not sufficient to improve sanitation because people were not used to such technology, and hence did not know how to use it or did not see the benefit in using it. Since my return to the United States, I have maintained an interest in EcoSan toilets and hope to revisit the area one day to see the results and to see if there has been changes in sanitation behavior in the area. The experience with UNICEF taught me many things about the development process, and in particular the difficulties of implementing projects unless

there is active participation from the community. It was clear that sanitation practices were one of the areas where community perceptions and behavioral change were particularly complex, as community members often did not understand the problems associated with their poor sanitation practices. Hence, I undertook this thesis to find out how participation from the community can be facilitated by organizations working in development, and how it is realized in the case of a local non-governmental organization (NGO), Society for Community Organization and People's Education (SCOPE), who were implementing the EcoSan toilets in Kameshwaram village.

I am grateful to UNICEF for providing me with the opportunity to work with them and for funding the research project that ultimately led me to the EcoSan project. I would like to thank all the SCOPE personnel that enabled me to attain the relevant information and gave me their time. I would also like to thank the community members that I met and interviewed, for sharing their experience and thoughts with me. Finally, I would like to thank my thesis advisor, Dr. Sioh for her guidance and efforts, and my two other committee members, Dr. Wirpsa and Dr. Tzoumis for all their time and input into helping me write my thesis.

Abstract

This study aims to describe the implementation model used for an EcoSan toilet project managed by a local non-governmental organization, Society for Community Organization and People's Education (SCOPE) in Tamil Nadu, India. The purpose of this study is to address the lack of documentation of implementation strategies on EcoSan toilets. EcoSan toilets are a relatively new concept in Tamil Nadu, and SCOPE has been the pioneering organization implementing the EcoSan toilets since 2002. The study will suggest that the implementation model utilized by SCOPE is one that is based on Participatory Action in Development (PAD) and guided by the model designed by the World Health Organization, the Participatory Hygiene and Sanitation Transformation (PHAST). The implementation model for EcoSan toilets is a critical factor to introduce the technology into the community and have it accepted. Beginning with the initial discussions with a potential pilot EcoSan user, which SCOPE chose to be an influential member of the local Panchayat of Kameshwaram, to the subsequent discussions and training given to the rest of the community on EcoSan, SCOPE has been able to garner interest about EcoSan toilets and convey information about its use. By making the process of attaining an EcoSan toilet demand driven, SCOPE is utilizing the PAD/PHAST model and allowing community members to take their sanitation situation into their own hands and be the driving force in their development.

Introduction

This study aims to describe the implementation model used for an EcoSan toilet project managed by a local non-governmental organization (NGO), Society for Community Organization and People's Education (SCOPE) in Tamil Nadu, India. The purpose of this study is to address the lack of documentation of implementation strategies on EcoSan toilets. EcoSan toilets are a relatively new concept in Tamil Nadu, and SCOPE has been the pioneering organization implementing the toilets since 2002 (www.scopetrichy.com, Date Accessed Feb 20 2007). The subject area is Kameshwaram, which is part of a village in the Nagapattinam District of Tamil Nadu that was affected by the 2004 tsunami. This study will suggest that the implementation model utilized by SCOPE is one that is based on participatory action in development (PAD) and guided by the model designed by the World Health Organization (WHO), which is the Participatory Hygiene and Sanitation Transformation (PHAST). The research indicates that this model has been a critical component in the EcoSan project in Kameshwaram and has been successful in gaining the interest of the target community. The process of sanitation improvement is more than just building the EcoSan infrastructure; it is about community attitudes towards sanitation practices and the knowledge they have.

At the time of data collection field visits between June and July 2006, the EcoSan project was in its infant stage. A pilot EcoSan toilet was in use and SCOPE was in the process of building 100 EcoSan toilets. Since then, SCOPE implemented an additional 200 EcoSan toilets in Kameshwaram between April and June 2007. Follow up research is required to find out if this target of 200 EcoSan toilets was met. The purpose of documenting the implementation model of SCOPE is to deliver a model to the EcoSan toilet knowledge community that can possibly be

utilized in other projects of EcoSan toilets and overcome obstacles in sanitation transformation. The study will also make a contribution to the literature on participatory action in development and provide a practical example of the theory.

The data collected is examined in the context of understanding how the EcoSan toilet sanitation system is introduced into areas where it previously did not exist, particularly areas of open defecation. The WHO acknowledges that taking cultural aspects into consideration is integral to sanitation improvement given that much of the success relies on sustainable behavioral change and addressing the mindsets of people (www.who.org, Date accessed March 20 2007). This is to say that development programs need to understand that sanitation cannot simply involve building the structure and expecting the community to use it, it must realize that habits and common practices are a part of a person's beliefs and understanding of what is proper behavior. This study will cover the relevant literature on EcoSan toilets and participatory action in development to form the basis for analysis of the case study. The literature review will first set out the background and technical aspects of EcoSan toilets, the dynamics of sanitation development and the theories of participatory action in development. This literature will provide information that allows the reader to become familiar with EcoSan concepts and various issues involved with its use. Additionally, the theoretical concepts involved with participatory action in development will inform the reader on why such an approach is desirable. The case study on Kameshwaram aims to bring a practical addition to the knowledge community for both EcoSan and participatory action in development. The data collected from SCOPE and EcoSan users in Kameshwaram will be used to illustrate the implementation model being used by SCOPE for the EcoSan project in this subject area.

MAPS

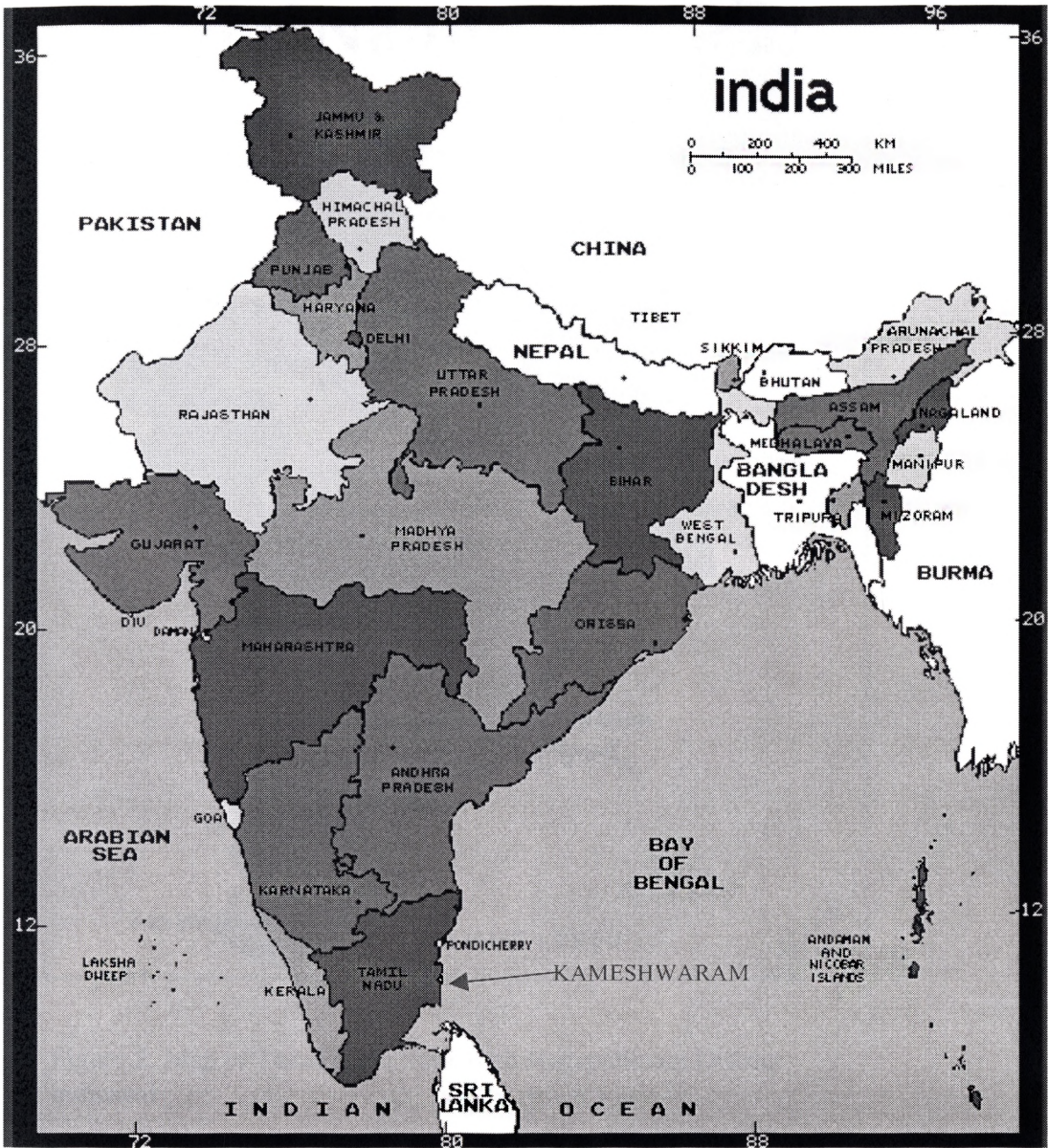


Figure 1. Map of India with general region of Kameshwaram indicated

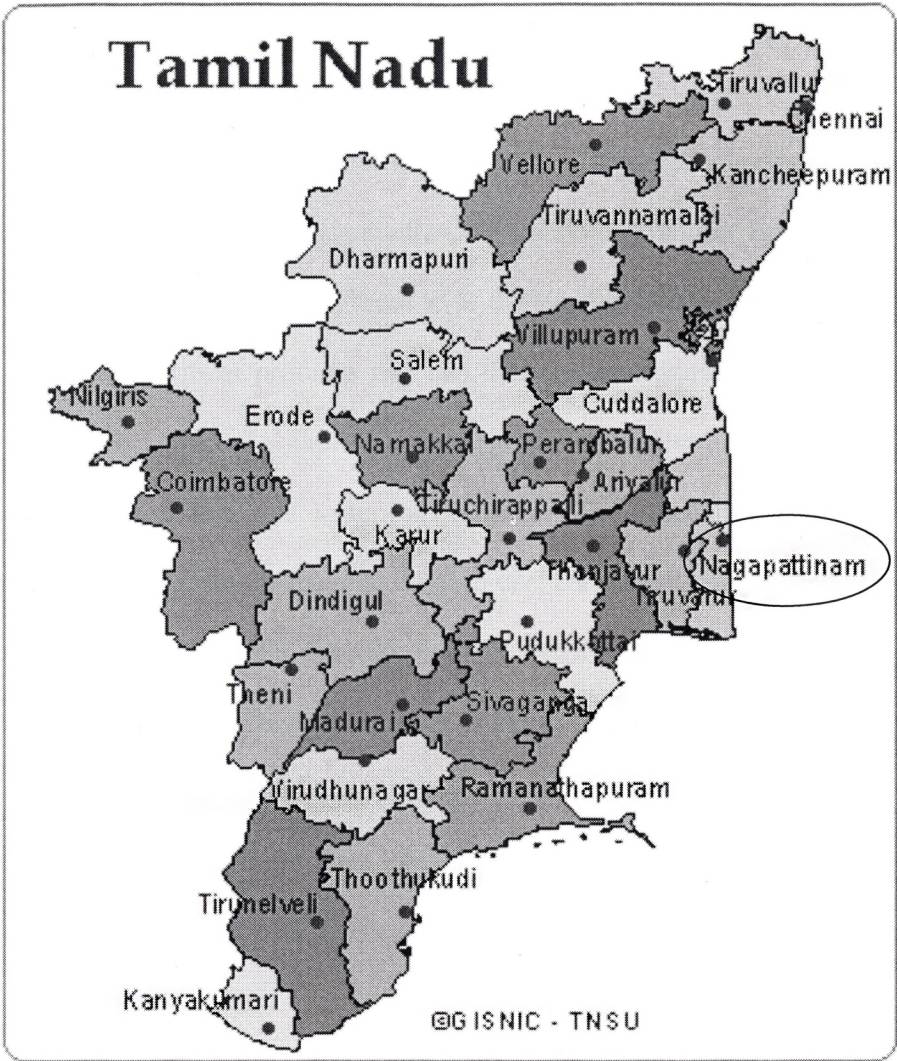


Figure 2. Map of Tamil Nadu State with Nagapattinam District indicated

What is EcoSan?

Eco-sanitation is a concept that involves innovative technologies that aim to create ecologically sustainable sanitation management. One technology within Eco-sanitation is the dry-pit urine-diverting latrine (hereafter referred to as the EcoSan toilet) that turns human waste (both solid and liquid) into fertilizer products that can then be reintroduced into the ecological system. EcoSan toilets are constructed completely above ground to collect human excreta in reusable containers to decompose and turn this waste into fertilizer. The toilet uses a limited amount of water that is collected away from the excreta. At each use, participants must mix ash into the solid excreta hole in order for the ongoing decomposition to occur. This process of decomposition and subsequent reuse of waste is a critical component of eco-sanitation, which is based on the desire to "close the loop" and create a sustainable ecological cycle (Esrey, 2001). It must be noted that there are several types of EcoSan toilets that have technical differences, but this report will only focus on the dry-pit urine diverting latrine that turns human waste into fertilizer that was designed, and is being used, by SCOPE.

EcoSan toilet located in Kameshwaram, Tamil Nadu

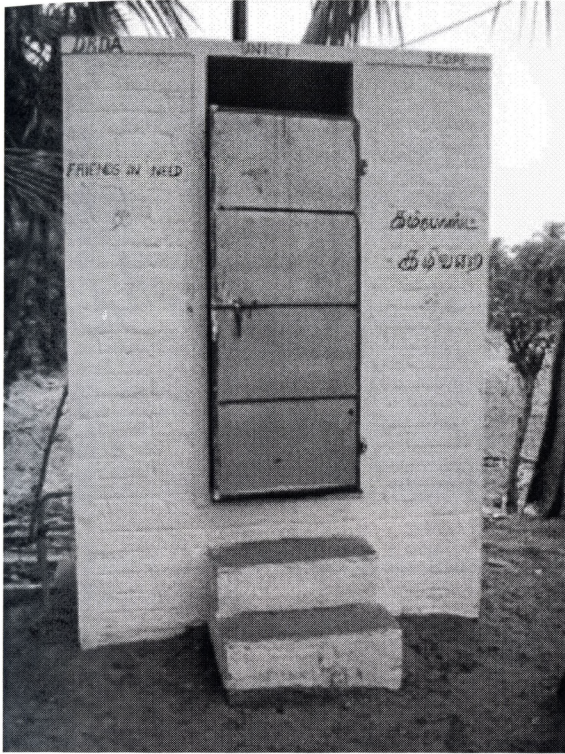


Figure 3. Pilot EcoSan toilet in Kameshwaram. Picture taken June 2006.



Figure 4. The floor of the EcoSan toilet. The hole covered with the lid is for the solid excreta and the hole in front is for the liquid excreta. The ash is located in the middle container. Picture taken June 2006

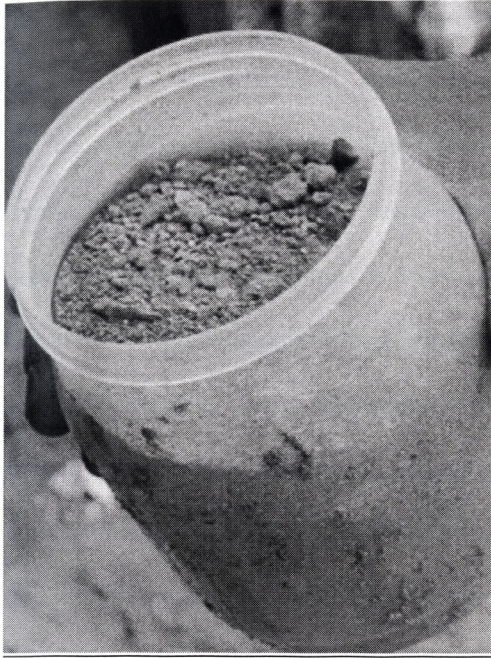
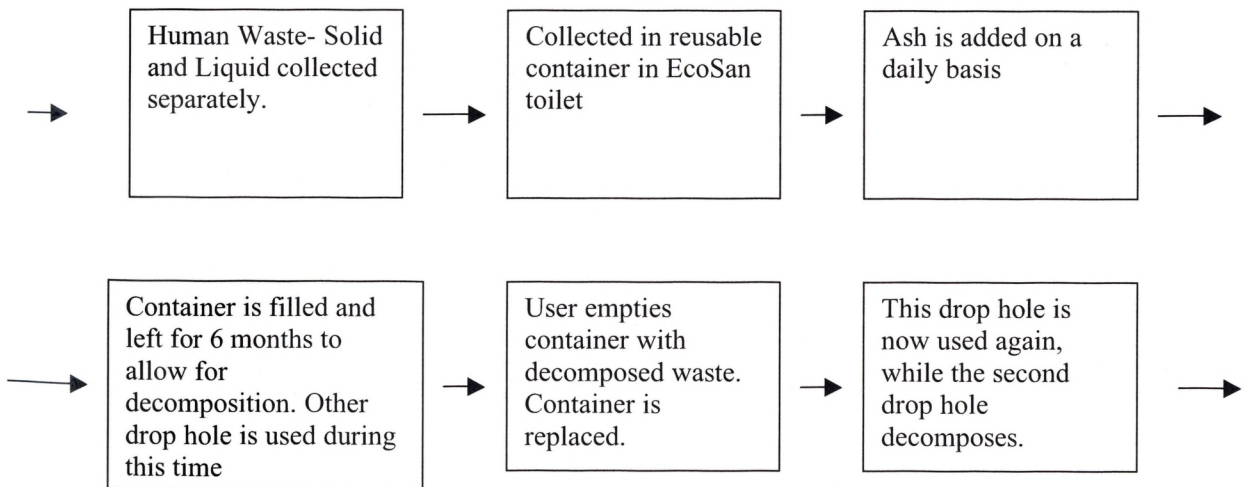


Figure 5. Decomposed waste from an EcoSan toilet.

The Closed Loop System



The Case of SCOPE

In the south Indian state of Tamil Nadu, EcoSan toilets have been rapidly developing and expanding over the past three years in both urban and rural settings, including the tsunami hit areas such as Kameshwaram. A local non-governmental organization Society for Community Organization and People's Education (SCOPE) based in Trichy, Tamil Nadu has implemented over 500 EcoSan toilets throughout the state and has reported a high level of success in transitioning people from open defecation to EcoSan toilet use (www.scopetrichy.org, Date Accessed June 20 2006). SCOPE has been specializing in water and sanitation for over ten years and works frequently with the State Government, national and international organizations. Prior to SCOPE undertaking EcoSan toilet projects throughout the state of Tamil Nadu, the organization was involved with implementing pour-flush pit latrines in areas of need for sanitation (www.scopetrichy.com, Date Accessed May 20 2007). As the organization grew, and the idea of EcoSan emerged, SCOPE has formed institutional relationships with the State Government of Tamil Nadu, UNICEF and WASTE of the Netherlands (www.scopetrichy.com, Date Accessed May 20 2007). SCOPE first constructed an EcoSan toilet in 2002, in Thanneerpandal village, Tamil Nadu with the assistance of its partners. Since that time, the SCOPE has advanced the technical aspects of the EcoSan toilet and introduced the idea to numerous other villages. SCOPE is funded by the State Government of Tamil Nadu, UNICEF, private donors, and various other organizations that they have formed institutional relationships with, on various sanitation projects.

Through networking and publicity through the media, SCOPE is well known as pioneers of EcoSan toilets in Tamil Nadu, and continues to form institutional relationships with organizations

such as the French FIR Trust, the German government and local institutions such as the District Rural Development Agency (DRDA) and the Indian Institute of Technology-Madras (IIT-Madras). Such institutional relationships are helping SCOPE conduct research on both the sociological aspects of EcoSan as well as the scientific aspects of the safeness of the decomposed material. SCOPE has also been asked by UNICEF to engage in capacity building of the EcoSan model and train organizations in other states in India on how to devise the ideal EcoSan toilet for the given area and also how to introduce the idea and implement the technology in the community.

In the context of this thesis, SCOPE was one of the organizations contracted by the government and UNICEF to work in the rehabilitation process after the 2004 tsunami that hit South India. The tsunami had left the community and the area significantly damaged and sanitation improvement was a critical factor in the rehabilitation process. The case of SCOPE and the implementation of EcoSan toilets in Tamil Nadu have relied heavily on participatory actions to allow the community to adapt to new forms of sanitation and also to spread the word about the benefits of EcoSan and improved sanitation in general. Open defecation was recognized as a common behavior and forming a new habit or behavior in the use of EcoSan illustrates a transition. EcoSan toilets were introduced in very small-scale pilot projects initially, and gradually other community members have been exposed to the concept through word-of-mouth originating with the users of the pilot project. Rather than top-down and supply-driven approaches, this model aims to create a demand-driven approach where community members initiate the change in sanitation behavior through a request for an EcoSan toilet after they have heard about its benefits. The testimonial technique has resulted in widespread enthusiasm for the EcoSan toilet and appears to correlate with the substantial number of requests for EcoSan in Kameshwaram thus far. A participatory approach in

sanitation practices is a critical component in not only spreading knowledge of EcoSan, but also in receptiveness to adapt to the dry-pit latrine model. I observed that community members who initiated the process and requested an EcoSan toilet from SCOPE had a demand for sanitation and had expectations for how EcoSan would help them. The case study of SCOPE and EcoSan in Tamil Nadu will illustrate the practice of the PRA and PAD approach. The case study illustrates the integral role women hold in the project, and further research may be required to truly understand the complete structure of the PAD level utilized by SCOPE.

Additionally, while the PRA approach was utilized to understand how the local community regarded the introduction of sanitation and how they responded to EcoSan, in this particular field, reasoning on the part of the facilitators and development organization must take into consideration that often local people do not want sanitation and do not want to engage in behavior change from open defecation to proper sanitation. Therefore, this study will illustrate how PRA and participatory action is critical to the spread of EcoSan toilets. It creates a demand for sanitation and allows people to understand why they want improved sanitation. PRA and PAD are critical in indicating to facilitators the types of people and communities that are likely to be conducive to engaging in behavioral change and adapting to the EcoSan toilet.

Literature Review

This literature review will first set out the background and technical aspects of EcoSan toilets, the dynamics of sanitation development and the theories of participatory action in development. The section is organized to firstly display the capabilities of EcoSan toilets and subsequently how it fits into the need for sanitation. The discussed theory on participatory action in development draws a theoretical framework from Robert Chamber's important discussions on this idea and furthermore the WHO model for implementation of sanitation projects that incorporate community participation.

EcoSan toilets

How EcoSan toilets work

An EcoSan dry pit urine-diverting latrine is an above ground permanent structure usually built from brick or cement. There are several models, however, the most efficient model has two-drop holes- one that remains covered while the other is in use. There is a separate hole that is used for passing urine that is collected also. The human waste is collected separately under the structure and users are required to add ash or lime into the drop hole designated for the solid waste, in order for the pathogens to die off and for it to enable decomposition. Generally, community members have the ash from their own resources, particularly the firewood they use for cooking. Once one pit is filled up, the users need to switch over to the other drop hole while the first pit composts. SCOPE estimated that it would take approximately six months for the hole to fill up and

approximately six months to decompose. Hence, the time frame for the switch between each hole corresponds since as one hole is filling up over a six-month period, the other hole is decomposing. There are various ways to design the two-drop hole model of the EcoSan toilet, and usually the specifications are tailored to meet the requirements of a community. SCOPE designed an EcoSan toilet, made of cement, with two drop-holes, both enclosed in the same solid structure. The design was made according to specifications gathered from the community, and in particular, it is a structure separate from the household, build out of solid brick and with a fixed door. The back of the EcoSan toilet has a panel that can be easily removed for the emptying process. This back panel is made of a cement block or a metal sheet that is securely attached, but is designed so the user has the ability and knowledge to remove and replace it during the pit-emptying process.

There are currently varying estimates to exactly how long is needed for the solid waste to adequately decompose and make it safe for handling. Varying research recommend from three months to two years (Redlinger, et al, 2001; WHO, 2002 b; Jackson and Knapp, 2005). The idea is for users to use the second drop holes while the first decomposes. Once the decomposing phase is completed, users are able to remove the material from under the toilet that will now be in the form of fertilizer that can either be used by themselves or sold to others. This entire "closing the gap" process is ecologically sustainable, manages human waste and prevents disease transmission. The urine diverting model is the most ideal and often the most promoted as it has the lowest risk of contaminating groundwater (Panesar, 2006). Also, some decomposing toilets have semi-permanent or portable structures and hence have different benefits and drawbacks, but should be remembered by implementers when choosing the best model (Jackson and Knapp, 2005).

Even though the concept of turning human excreta into a fertilizing product is definitely not recent, the conceptualization of EcoSan toilets as a physical structure is. Various organizations have pioneered designs for a structure and additionally an implementation method in several developed and developing countries. This concept is still very much in its infancy stage with results from the pilot programs currently being compiled and evaluated to get a better understanding of the issues that arise with EcoSan, both positive and negative. While most results seem to deliver favorable results of the dry-pit latrine and the ability for this model to turn human excreta (both solid and liquid) into safe fertilizer to use, there are existing questions that challenge the safeness of the decomposed material and its ability to be reused. There are several foreign governments that are heavily advocating and sponsoring EcoSan toilets in the developing world particularly Germany, Sweden and the Netherlands and are actively researching the safeness of the excreta to determine the best practice. Additionally, several international conferences and networks have emerged to connect professionals involved with EcoSan in order to facilitate them to share experiences and knowledge. Some such examples are the International Conference on Ecological Sanitation that has been held yearly since 2001 and the on-line website/network ecosanres.org (www.ecosanres.org, Date Accessed Jan 12, 2007).

Where are there EcoSan toilets and what are the results thus far?

A review of documentation worldwide indicates there has been a rapid growth in the number of EcoSan projects in the 21st century. China, Vietnam, Kenya, Tanzania, Ethiopia and India are among the countries where EcoSan toilets have been piloted by various international institutions, governments and local organizations. Population growth in both urban and rural areas has placed

heavy burdens on developing countries to develop water and sanitation processes as quickly as the rate of population growth. This task is difficult and lack of sanitation has been one of these main problems. EcoSan toilets have been introduced on a one per household basis; however, there are additionally numerous projects where it has been introduced in schools, slums and other areas for shared use (Panesar, 2006). To date, most of the documentation on the pilot projects has indicated that subsidies were provided to construct the EcoSan toilet. According to the Water and Sanitation Report on EcoSan experiences in Eastern and Southern Africa, the subsidies have "been so large as to be unsustainable for a regional or national program" (Jackson and Knapp, 2005). Nonetheless, while this report seems to be relatively pessimistic about the ability of EcoSan to be implemented without subsidies, the concept should not be discounted and rather other ways of funding should be derived.

In Eastern and Southern Africa EcoSan toilets have been introduced in a very small scale. This has led to very slow progress of improving sanitation conditions and resulted in EcoSan remaining only in small-scale project status (Jackson and Knapp, 2005). While the overall consensus has found limited acceptance of the technology, the study found the problems might lie in the implementation and marketing of the technology into the community. In the case of Kenya, a significant factor that discouraged use of the EcoSan toilet was that the model was not easy to use and required the user to put in more effort with the actions such as adding ash compared with a flush-toilet. Furthermore, the issues relating to the urine diversion and subsequently the handling of decomposed feces, not only presented itself to be cumbersome, but also culturally taboo (Jackson and Knapp, 2005). Only in areas that had hydrological problems, was the interest in EcoSan substantial. It should be mentioned that part of the pilot project in Kenya involved another

type of toilet labeled the Arborloo that did not use the urine separating mechanism and was not a permanent structure. Basically it is a sole pit that takes approximately one year to fill up and once that occurs the portable structure is moved and a tree is planted in its place. The evaluation showed that this model was more widely accepted and users maintained use and the model was even replicated by others (Jackson and Knapp, 2005). Follow-up research is required to understand why the community members adapted to the portable structure model as compared with the permanent structure. A possible finding could be because the portable structure did not separate the solid and liquid waste, and hence, the user may have found it easier to use and maintain.

Nonetheless, the urine diverting EcoSan toilet showed more acceptance in other parts of Africa. In Zimbabwe and South Africa, EcoSan toilets were built in much larger numbers (1800 in Zimbabwe and 15,000 conversions in South Africa). Also in Tanzania and Uganda the results showed that use of the facility was generally accepted as a sanitation improvement. However, the problem mainly arose due to cultural resistance to handling the decomposed material and utilizing it to grow plants. Many users were unfamiliar with the handling of the fertilizer and it was seen as taboo. Additionally, agriculture grown from the human fertilizer was also not widely accepted, another facet of the taboo relating to contact with human excreta, even after decomposition (Jackson and Knapp, 2005). Nevertheless, the EcoSan toilet was seen as an asset to the users because they saw it as a solid and permanent structure that provided a safe and hygienic solution for their sanitary needs. When pit-emptying services were introduced, such as the case in Tanzania where local volunteers started this service for a small fee, the prospect for using EcoSan increased (Jackson and Knapp, 2005). The demonstration and viewing of the decomposed material is likely

a critical point that may allow EcoSan users to see the usefulness of the toilet and overcome the cultural resistance to handling decomposed waste. Specific research would likely need to be carried out to investigate this turning point further and exactly what information persuades a user to accept the process. Preliminary evidence from the projects in Tanzania indicate that even though users did not have much value for the reuse of compost and were not inclined to handle it due to cultural taboos, the people accepted the use of the technology because it provided them with a reliable and safe sanitary solution. The EcoSan project in Malawi saw farmers self-promoting the EcoSan toilet to other farmers after the initial emptying of the decomposed pits and seeing first hand that the contents were decomposed and were not difficult to smell or handle (Jackson and Knapp, 2005). Hence, project design must account for the fact that some cultures will want to reuse the waste or clear the pits and a need for a subsequent service will be needed in order for users to continue to use it (Jackson and Knapp, 2005).

In the case of Mexico, EcoSan toilets were introduced in both rural and urban settings. The successful project was in an urban setting as project evaluation reported a general satisfaction from all participants and the local NGO that administered the EcoSan toilet. Given this was the first time the NGO administered EcoSan, the problems it encountered with community education and monitoring was seen as a building block on the model of the project implementation. In the case of rural Mexico, the lack of community education and follow-up monitoring saw the EcoSan pilot project fail to effectively change the habits of the population (Beaudoin and Cuellar, 2005). The researchers suggested that family and community education was necessary and additionally, more communication and input was required by community leaders in order to organize the community and give them reassurance that the EcoSan is a good improvement (Beaudoin and Cuellar, 2005).

Suitable target areas for EcoSan toilets

To sum up thus far, countries with large rural or peri-urban populations, high water tables, flooding, water logging, rocky soils, open defecation practices or water scarcity problems are among the best candidates for EcoSan toilets (Redlinger, et al, 2001). For countries with large rural populations EcoSan toilets are a way to provide sanitation facilities. Particularity when government resources are strained, costly sanitation techniques such as septic tanks that require regular cleaning or large sewage systems that need to cover large areas, are not likely to be undertaken for immediate development. Individual toilets, that are low in cost and that do not require regular cleaning is one way to provide sanitation facilities.

Geographic areas that have high water tables or are water logged are susceptible to contamination through sanitation systems like septic tanks or pits as human excreta often infiltrates bore wells, surface and groundwater. Since EcoSan toilets are built completely above ground, with the pit made of solid brick, these toilets prevent leaching into the water sources and additionally are a solution in areas of rocky soils where other underground sanitation models are unable to work (Jackson and Knapp, 2005). This is an additional benefit in areas where flooding occurs causing the water to mix with the waste. The EcoSan above ground structure prevents this from happening. Additionally, open defecation practices especially in densely populated areas are susceptible to vector-borne disease, bad smells and nuisance from flies and mosquitoes and an overall deterioration of hygienic conditions. This is also the problem with pit latrines that do not decompose particularly in the wet season (Beaudoin and Cuellar, 2005). Often communities that live in coastal areas practice open defecation on seashores, further adding to the environmental

contamination of seawater. Lastly, in areas where water is scarce and cannot be utilized for things like flush toilets, the EcoSan toilet requires only minimal water for cleaning and personal washing. The need for water is practically eliminated as the waste composts rather than needs to be washed down (Panesar, 2006). There are several hindrances that need to be overcome to ensure the success of the EcoSan toilet. Cultural practices, stigmas and beliefs can prevent adaptation to using an EcoSan toilet. While certain individuals or groups may never be the suitable candidates for EcoSan, participatory action through user preferences and social marketing can be a powerful tool in behavioral change and adaptation.

Sanitation Management

The Need for Sanitation

Adequate drinking water and sanitation are often cited as the basic precursors to further development and improvement in people's lives (Howard, et al, unknown). If a community cannot rid themselves of continuous ill health caused by poor sanitation or access safe sources of drinking water in a timely manner, then all subsequent efforts in economic or social development are severely hindered. However, sanitation attracts less attention from international donors and the respective governments because it is seen as a household problem rather than a community problem (Howard, et al, unknown). Understanding sanitation improvement in the context of community development is necessary and thus needs the attention and support of governments and international development organizations. Improving sanitation includes adequate management of human excreta; solid and liquid waste management and ensuring safe environments that do not allow diseases to form and spread. According to the WHO, approximately 2.6 billion people

lacked access to improved sanitation, this number represents 42% of the world's population, most of whom are in rural areas throughout the developing world (WHO, 2004). Furthermore, inadequate sanitation is inextricably linked with problems of drinking water quality and contamination, and there is a consciousness that the problem of safe water needs and sanitation must be addressed hand-in-hand (WHO, 2004).

The management of human excreta must be approached with innovative ideas in order to address the sanitation problems of the developing world. The threat posed by inadequate management of human excreta places people at the risk of health problems that often result in death as a result of the contamination of drinking water sources or soil. Additional risk exists with excreta through contact with parasitic vectors (flies and mosquitoes) and touch (WHO, 2002). Contact with human excreta, whether through water, food or hands leads to disease such as cholera, typhoid fever or amoebic dysentery that prove fatal to millions each year (Panesar, 2006). In order for the excreta to present a problem and contaminate, individuals who are infected with pathogens must excrete it. However, it is impossible to know the levels of infection within any given community because often individuals who carry the pathogens generally display no visible symptoms. Hence, proper sanitation management is a critical component in dealing with disease control because it cannot be known the number of individuals that harbor pathogens, but it is established that their excreta poses critical problems (Howard, et al, unknown). According to the WHO (2004) "improved sanitation reduces diarrhea morbidity by 32%; access to safe water and sanitation facilities and better hygiene practice can reduce morbidity from ascariasis by 29% and hookworm by 4%; better management of water resources reduces transmission of malaria and other vector-borne diseases." Furthermore, research from Johns Hopkins University found that inadequate water supply and

sanitation adversely affected child growth height and increased the cases of diarrhea (Checkley, et al, 2004).

In the context of the United Nations (UN) Millennium Development Goals (MDG's) established in 2000, improving sanitation meets several goals and targets. These are:

Goal 4- Reduce child mortality

- Target 5: Reduce by two-thirds, between 1990 and 2015, the under-five mortality rate.

Goal 6-Combat HIV/AIDS, malaria, and other diseases

- Target 8: Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases.

Goal 7- Ensure environmental sustainability

- Target 10: halve by 2015, the number of people without adequate access to safe drinking water and basic sanitation, and in doing so, incorporate sanitation into water development strategies.

Given that progress to meeting the MDG's has not met set targets throughout the world (UNICEF, 2006), harnessing EcoSan toilets on a greater scale may contribute to meeting critical goals, particularly in areas where disease and death can be traced to fecal matter. Additionally, the model of implementation used by SCOPE allows sanitation to be demand-driven rather than supply-driven; a critical factor in meeting the MDG's. There is evidence to support the finding that when sanitation projects are imposed on communities there is a high rate of failure. A study of the water and sanitation conditions in a village in India found that a supply driven project that implemented pit latrines in homes failed because the community members used the toilets as storerooms (Black and Talbot, 2005). The study highlighted several other supply-driven interventions in water access that also proved unsuccessful, as the attitudes and desires of the community were not taken into consideration. An example of the "one-option-fits-all" response to applying technology to meet water needs, an NGO presented a community with borehole water, that despite the water it could provide, was avoided by potential users because of a perception that boreholes harbored diseases (Black and Talbot, 2005). This was also my overwhelming experience while visiting the reconstructed tsunami villages where community members were living in newly built houses with adjoining toilets. While it was difficult to actually ask and authenticate if the people were using the toilets, my observations from several people's homes indicated that the toilets were being used to store water in containers or fishing equipment. Hence, creating awareness amongst community members is critical to allowing them to make informed decisions about their sanitation practices and creating a demand for sanitation. Improved Sanitation can prevent disease and contamination in several areas including water and soil contamination and vector-borne diseases and conveying such information to community members gives them the opportunity to better understand their situations.

Water and Soil Contamination

Biological water contamination results from contact of water sources with human and animal feces. As I have mentioned earlier, water contamination can occur through several means, the most common being open defecation, from pit latrines that leach sewerage into the groundwater, municipal sewerage systems or septic tanks that also leach into the ground water because of wear and tear on the given infrastructure (Howard, et al, unknown). Often with centralized sewerage systems, if pipes and other infrastructure are not adequately maintained, waste will leak into groundwater. There are also sometimes problems with the design of the centralized sewerage systems. Even if sewerage goes through a sufficient treatment process and is then discharged into the surface waters, this can ultimately also cause contamination when persistent substances reach the groundwater (Howard, et al, unknown). These kinds of pollutions are the most common and deadly that lead to infectious diseases such as diarrhea, hookworm and schistosomiasis. There are several indicator organisms that can determine the various specific bacterial contaminations in water; however, *Escherichia coli* (*E. coli*) is generally given as the main indicator organism to determine if fecal matter has contaminated water (Gadil, 1998). Once again, children are the most vulnerable group to fall victim to these diseases. According to the WHO, 1.8 million people die every year as a result of diarrheal diseases (a common disease being cholera), of which 90% are children under the age of five (WHO, 2004). There is also a growing concern that urine can pose a threat to groundwater. The threat comes from nitrate contamination in situations where urine is collected separately in dry-pit sanitation (Howard, et al, unknown). Nitrogen is generally able to degrade easily into ammonium, however, the storage times must be carefully monitored because

too much time can alter this oxidization process and reverse it back into nitrogen. Given that nitrogen is highly soluble, it poses a serious risk to groundwater and hence, any sanitation system must account for this threat. Additionally, during the rainy seasons, water sources risk defecation being washed into them (Howard, et al, unknown).

Soil contamination can also occur through similar means such as open defecation and improper sanitation systems. Open defecation has the potential to leach into the soils and reach the groundwater or shallow springs. Pit latrines or septic tanks involve some level of decomposition and depending on the design, proper use and maintenance, can either be successful or create significant problems. For example, pit latrines that are built underground could present problems as excreta could have contact with the soils and groundwater if there are gaps or leaching from the sides or base of the pit. Septic tanks present similar problems in that if not properly maintained can lead to contact with groundwater. A septic tank is a impermeable tank where the human excreta and the wastewater is collected and allows the solids to settle on the bottom of the tank and the scum to collect on the top. The tank is designed for the solids to settle under the water in order to prevent a bad odor. Basically, as the water in the tank rises it is diverted out into some kind of sewerage treatment facility such as a soil drainage field (Howard, et al, unknown).

The risk this problem creates is intestinal worm infections such as hookworm or whipworm, which are commonly spread through soil contaminated with human feces (WHO, 2002). There is also an intestinal form of schistosomiasis that is caused by a parasitic worm and carried through human feces or a vector snail. These diseases can easily take hold in areas where open defecation is a common practice and additionally where people walk barefoot. Children are very susceptible to

being infected with these diseases. Additionally, in disaster locations, high-density camp living and areas where many are suffering from malnutrition, these diseases have an increased chance of affecting the population (Rwabigene, 2002; WHO, 2002). Intestinal worm infections have been correlated as causal factors of anemia, malnutrition and cognitive impairment. This subsequently reduces one's ability to function productively and has also been shown to cause school going children sever hindrances to their development (UNICEF, 2006).

Vector-borne Diseases

Areas of open defecation or improper disposal of human waste often can become grounds where disease carrying flies or other insects breed. A high density of the vectors in any given area can increase the “risk of transmission” of Shigella dysentery or trachoma (WHO, 2002). Shigella is transmitted between people through fecal contamination on one's hands. The disease is also spread by contaminated food and water. Trachoma is a spread because of a lack of face washing. It can lead to visual impairment and in the most serious cases, blindness (WHO, 2004). In another possible area of concern, there is no concrete link between the carrying of excreta on vectors and a correlation with the transmission of disease; however, if vectors carry fecal matter on their body there is a possibility they can transport it into other areas or water sources and thus contaminate (WHO, 2002).

There is no doubt that a lack of sanitation leads to health and economic problems. Anemia, malnutrition, physical impairments, diarrhea amongst many other infectious diseases cause lowered productivity, economic strains on families and thousands of deaths per year. It is believed

that half of the people in the developing world suffer from at least one of such diseases that are a result of inadequate water supply or sanitation (WHO, 2004). Particularly children fall victim to these health problems leading to the high levels of mortality of children under five and lowered productivity in all aspects of the development. It is clear that sanitation is the precursor to development throughout the developing world and that improving sanitation within a specific area can improve the quality of the drinking water and hence have causal links with improving the overall quality of life (Gadgil, 1998). Strategies must take into consideration that investment in sanitation is an investment that is required and can improve levels across the board in other areas of development such as education and livelihoods. Furthermore, areas of disaster and high density living (such as refugee camps) are particularly susceptible to sanitation problems and hence sanitation should be a priority and primary concern given the ripple effect it can have on all other aspects. A combination between effective sanitation programs aimed at behavioral change and suitable technology is required in order to make the most gains in sanitation improvement.

Sanitation in the post-Tsunami affected areas

The task of restoring proper water and sanitation systems in the tsunami-affected areas required both short-term and long-term strategies. In the immediate aftermath of the affected areas, public health concerns had to be addressed through the relief responses in the camps in order to ensure that communicable diseases did not exacerbate the death toll (VanRooyen and Leaning, 2005). Long-term rehabilitation is significantly different from the immediate relief response and requires strategies that address the various problems with the goal of sustainable solutions. With specific relation to hygiene and sanitation, it requires consideration of the levels of hygiene awareness that

existed prior to the tsunami. One should not assume that the community members were unaware of the serious health risks associated with poor hygiene, but neither should one assume that they had an understanding of hygiene related risks (Walden, 2005). Hence, solutions that are developed must take into consideration community knowledge and participation in order to ensure a combination of local knowledge and appropriate intervention from a rehabilitating organization. Most organizations involved in the tsunami rehabilitation process combined providing both infrastructure improvements with tangible hygiene promotion activities.

In the tsunami-affected coastal areas of Nagapattinam District, Tamil Nadu efforts to develop sustainable sanitation projects were a main priority by government and various NGO's. Paul Calvert, the pioneer of EcoSan toilets in India, has been a strong advocate of sanitation solutions that protect the groundwater and additionally conserve water resources. Calvert, who runs eco-solutions, an Ecosanitation organization based in Kerala, introduced the EcoSan toilet concept first in the state of Kerala in 1995 and has subsequently worked with the various NGO's to expand EcoSan toilets to other parts of India. In a letter to a Tamil Nadu government official, Calvert states, "As reconstruction of tsunami-hit villages gets under way, ecological sanitation should be very seriously considered as an important option (cited in Panesar 2006)." Calvert asserts that due to the tsunami, the coastal areas have been affected with salt water intrusion. Additionally, coastal areas also experience high water tables and significant water logging, further threats to the groundwater. Calvert argues that water-flush toilets, septic tanks and pit latrines present serious threats of fecal contamination in ground water in areas of high water tables. Hence, implementing such sanitation infrastructure would not prove sustainable and negative consequences would arise. Calvert offers eco-sanitation as a viable option to protect groundwater from fecal contamination,

conserve water resources, create valuable fertilizer products and protect public health (Panesar 2006). EcoSan toilets are only one of several other eco-sanitation solutions that are being considered by the government and NGO's. Additionally, given the significant influx of finance from international and national sources, the government of Tamil Nadu adopted a strategy to "Build Back Better," and address problems of the community that existed prior to the tsunami, such as sanitation. Calvert is among a growing number of experts and organizations that see eco-sanitation as a innovative solution to sanitation in India.

Attitudes towards Sanitation (Evidence from a Fishing Community in Tamil Nadu)

Caritas Germany in conjunction with reconstruction and sanitation experts conducted a focus group discussion in a tsunami-hit fishing community, Chengalpattu, almost one year after the tsunami hit in 2004. The nature of the discussion was to find out community attitudes towards sanitation facilities, and if they did in fact want sanitation facilities, the reasons why. Additionally, the discussion presented a short video of a pilot EcoSan compost toilet from another village, to gain an understanding if the community members were interested in this idea and what they felt would be the benefits and problems associated with its use. The findings presented in a Caritas report are quoted below:

The following reasons were given for “why sanitation?”:

- The ground they were using for open defecation has been recently sold and totally cleared from bushes. They now have no place to go.
- During night-time, and for ill people it is difficult to go far from the house. A near-by toilet would be a clear advantage.
- In day-to-day reality a lot of faeces spoil the place, with clear negative health impacts are.
- Women go only in the early morning, or during night time, which is not good for the health.

[Comment from the author: According to WHO-figure, kidney problems (renal calculi) significantly increase, when women avoid drinking to be not forced to search for a place for defecation during daytime]

- No women goes alone at night ...one relative has to come ...
- At night one Lady was bitten by a snake and died
- Males and females mention that “males disturb females”
- There are many cases of diarrhoea in the village, especially children are affected. It is not possible to go far with the sick children for defecation.
- Children and animals are around the houses during the day and children may be contaminated

When asked what kind of toilet or latrine they want, the following points came up in the discussion.

- The villagers were fully aware, that pit-latrines do threaten their drinking water supply.
- They suggested to make a sewer into the sea, but realised, that the health problem will not be solved like this.

As judgement of the 10-minute-video on the Tiruchi “compost-toilet”, they rose the following points:

- They have the experience that trees grow more and better coconuts when fertilised with greywater and nutrients from the kitchen.
- They have the experience that coconut-trees can be over-fertilised with urine.
- They do not have enough land to get the full benefits of the ecosan approach.
- They find the technology very new and interesting, and would like to see it in action, e.g. through a demonstration toilet build in their village for an interested household.
- They would not eat the fruit and vegetables grown with ecosan fertiliser, but would sell them.

(Sequence of points as raised by the fisher-folk in the discussion)

Taken directly from: Panesar, D. A. R. (2006). Suggestions for sustainable sanitation in Tsunami hit regions in South India, Caritas.

Figure 6. Expert of Focus Group Discussion results from Caritas.

This focus group discussion suggests that community members are conscious of both environmental and health factors related to proper sanitation and recognize that sanitation facilities will lead to benefits for them. Additionally, it suggests that community members were motivated by several other means including safety, accessibility and dignity. Particularly for women, the need for a sanitation addresses health, safety and issues of dignity. The presence of an EcoSan toilet will provide a solid structure, closer to the house, and eliminate the necessity for women to go far into the field and be susceptible to dangers. Additionally, the EcoSan toilet provides an area where a women can have privacy, and not be constrained to avoiding going to the bathroom, or even avoiding drinking liquids so that bathroom use will not be as frequent. The results relating to the EcoSan toilet indicate that community members were receptive to the idea of utilizing the decomposed waste and had a general background on how human waste can be linked with fertilizer. Additionally, it indicates that demonstrating the EcoSan technology with a video can create interest and receptive to using the technology to their advantage by selling the produce grown from the fertilizer. This discussion also indicates that the community members want to see the EcoSan technology in practice, and hence, introducing the idea through a pilot project is ideal.

Participatory Action Development and the Participatory Hygiene and Sanitation Transformation

The literature included in this section will highlight the theory of participatory action in development, often referred to as Participatory Action Development (PAD). I will discuss how the PAD approach is utilized in sanitation projects, including some examples of EcoSan projects. Substantial literature exists from over the last ten years indicating that participatory action in development is being adopted by local, national and international agencies to address issues in development from livelihood improvement to education. There are currently various approaches being used in the effort to improve the water and sanitation in the developing world and there is vast amount of data from international organizations such as the WHO and NGO's that suggests that the participatory action approach is growing in use and gaining momentum (www.who.org, Date Accessed on Feb 20 2007).

Rather than relying on completely top-down institutionally based interventions, participatory approaches involve the people being affected as integral agents in the intervention process. While designs of the structures that exist between the various agencies may differ, the basic design is a collaborative relationship between the agencies at the institution level and the people at the ground-level. The design recognizes that the people targeted by the intervention must be willing participants in the process in order to achieve success (Black and Talbot, 2005). Additionally, by requiring that the people at the ground-level have a degree of investment and interest in the intervention, it is believed that the project can be sustainable and carried forward by the people without further input from the institution level. Furthermore, given that the methodology relies on

a facilitator- it is understood that this facilitator must be prepared to listen to the community, regardless of whether the facilitator is an international, a national or a local organization (Chambers, 1995). Below I discuss the existing data that reports the success and failures of the various PAD strategies into a collection of knowledge of what works and what doesn't within this methodology.

Participatory approaches have existed for over 40 years (Missingham, 2000/01). From documentation of development activity in the third world generally conducted by NGO's, it is apparent that this approach has been growing in use since the 1980's. According to Missingham (2000/01), this increased attention to participatory development arose from a perceived failure of the strategies that development organizations had implemented over the previous decades. Additionally, in 1980 the United Nations initiated a process to allocate more power to rural people in the development process (Missingham, 2000/01). Essentially, the idea of "participation" rests on the dynamics of local organization, local desires for the community and the structure of the development process that collaborate foreign, national and local agencies with the individuals affected.

A significant point during the emergence of this dialogue on participatory development is Robert Chamber's (1994) work published in the journal *World Development* on Participatory Rural Appraisal (PRA). In this series of articles, Chamber's (1994) theorizes this practice of NGO's to assert that practitioners have evolved a thought process that aims to achieve the best ways of "learning and doing" and in doing so have developed the PRA approach that allows local people to assess and report on their situation and for this information to act as a catalyst for development.

Chambers (1994) terms this PRA referring to a process that seeks to enable and empower people to “take control over their own development.” This thought process in effect transforms a one-sided relationship between the institution and the local people to create a more equal platform and allow local people to have tangible control over resources and ideas.

A subsequent article written by Chambers (1995) “Poverty and livelihoods: whose reality counts?” is a challenge to professionals working in development to question the mainstream paradigm of development. He outlines that the aims for development for the poor are often imposed on them by the outsiders who use their own blueprint for employment and lifestyle by projecting “northern concerns” onto the south. Chambers proposes to these practitioners that they “review and reorient normal professional concepts, values, methods and behaviors which serve ‘our’ purpose and instead enable the poor to express their reality.” In doing this, Chambers is pointing out that what one may think is ideal living in the north, is not necessarily what those from the south strive to attain. It is important to recognize that “the poor” have an understanding of their situation and hence an understanding of what they desire in development. The PRA “is the basic human right of poor people to conduct their own analysis,” and report on their reality, “their values, definitions of well-being and priorities (Chambers, 1995).” The PRA is an important tool for numerous organizations and practitioners and is utilized by various developing countries and the World Bank for changing the behavior, attitudes and ways of acting as facilitators for participation from the poor.

Chambers’ writing has conjured debate amongst academics who critique the basis of the participatory action development approach, and the foundation that Chambers’ argument rests

upon. Ilan Kapoor (2002) finds that Chambers has not sufficiently been examined and there could be serious questions with respect to the foundations of the participatory theory. Kapoor reasons that due to the fact that Chambers work ignores questions about “inclusiveness, the role of PRA facilitators, and the personal behavior of elites overshadow, or sometimes ignore, questions of legitimacy, justice, power and the politics of gender and difference”(Kapoor, 2002).

Kapoor (2002) identifies several gaps in the theorization of this participatory development model. Drawing on Habermas’ writings on “deliberative democracy,” Kapoor asserts that Chambers’ model of participatory actions have no “systemic rules of “legitimizing force” governing participation and group interaction.” Basically, the discrepancy lies in the lack of formal procedures offered by Chambers for ensuring that the participatory actions are truly legitimate. For example, during a group discussion with a facilitator, are women provided an adequate forum to express themselves, or any other marginalized group or individual for that matter? Hence, what Kapoor finds is missing is a structure that ensures all participants equal ground for the “ideal speech situation (2002).” Kapoor refers to Habermas’ theory as a better process as it provides for a procedure that ensures facilitated discussions are coercion free and that all have the opportunity to have their perspective heard, thereby calling for the “institutionalization of PRA.” Habermas proposes a clear proceduralist approach for democracy and illustrates three separate models of such a democratic approach that take into account the various mediums for interaction and deliberation in a society. These models allow for self-organization of the community and power to remain in the hands of the public, by forming a popular sovereign system that facilitates communication in equal grounds between institutions and people (Habermas, 1994). Kapoor asserts that this would not “over-codify” the process and that it is necessary to ensure that PRA is

simply not just entrusted to the facilitator on an individual basis, but must be devised in order to bring legitimacy to PRA results and ensure marginalized groups or minority opinions are heard and furthermore, considered to produce results that meet the needs of all equally (Kapoor, 2002).

Certainly when Chambers proposed the PRA, he hoped that it would produce optimal results for all community members, including the marginalized and minorities. This is evident from the very ethos of Chambers writing that rests on the belief that the poor must all have a voice and inevitably control their own development (Chambers, 1995). While it may be ideal to institutionalize the PRA process of receiving knowledge from local communities, it may not be so easy to implement in practice. Ultimately, ensuring all voices are heard rests on the individual facilitator and it is important that the organization properly trains these individuals to create equal and safe spaces for delivering knowledge in the hope that it will be implemented as theorized. Unfortunately, such codifications and procedures may run the risk of hindering the full dialogue and creating a bureaucratic process that formalizes the dialogue to the point where local participants do not feel comfortable to speak spontaneously or openly. Regardless of the lack of procedure in Chamber's theory or Kapoors' more defined procedure, it must be understood that different approaches to the PRA process can be implemented in different cases and localities. Over codifying procedures may be ideal in theory but may fail in implementation varying from one area to the next. Overall, Kapoor does make correct point that the PRA facilitator must ensure that all individuals are heard, especially the marginalized, and this can be institutionalized to some degree, but it must be understood this cannot be guaranteed even if institutionalized.

Participatory Action Development, PHAST and Sanitation Development

The improvements in sanitation rely heavily on behavioral change and the participatory action approach is likely to be considered as an option given the complexity of adapting to a new sanitation behavior. Hence, there is a vast amount of data that indicated that PAD is being used by local, national and international organizations in the development process. The WHO has developed the PHAST model based on the theoretical foundations of PAD and goes further to give criteria and steps to actually designing a participatory approach for sanitation transformation.

PHAST is defined as “an innovative approach to promoting hygiene, sanitation and community management of water and sanitation facilities.” It is realized through a methodology that allows “participatory learning” and aims to give communities the capabilities and power to manage their own water and sanitation situation.” PHAST promotes *health awareness and understanding*, which endures to change behavior and thinking processes (www.who.org, Date Accessed Feb 20 2007). The PHAST approach asserts that sustainable behavior change can be achieved when people understand the impact that it will have on their health. The PHAST model illustrates principles on promotion, learning and mechanisms for information exchange and delivery. Throughout, the PHAST focuses on creative ways to allow people to gain knowledge about their sanitation situations and make decisions for themselves. The PHAST model has been tested since 1993 through WHO partners United Nations Development Program (UNDP) and World Bank and currently the WHO has published a document that illustrates the step-by-step process for utilizing the PHAST model that takes into consideration the lessons learned from previous case studies and the subsequent reviews. Awareness building amongst community members and villages is critical

to transforming sanitation development from a supply (top down) approach driven by formal institutions to a demand (bottom-up) approach driven by the community themselves. A review of the various projects of sanitation interventions and then more specifically EcoSan toilets in various parts of the world will demonstrate the different ways participatory action and PHAST has been used. Of course, EcoSan projects that have utilized a top-down approach will be referred to in order to assess this methodology and ultimately determine the most ideal approach to implementing EcoSan toilets and enacting behavior change.

Ghana is an example of successful participatory action development. UNDP in conjunction with the government of Ghana began a rural water and sanitation project that was implemented in two districts over a five-year period from 1991 to 1996. The project objectives were to setup 120 boreholes with hand pumps, 750 latrines and establish a community management system to maintain the community water and sanitation situations. The flexible approach that project staff and facilitators utilized in working with the local populations is attributed as the vital element that resulted in the successful projects that ultimately led to improved water and sanitation conditions and improvement in health indicators (Dotse and Laryea, 2004). Central to the program design and implementation was the research data that was collected in a socioeconomic study of the two districts that defined that specific characteristics of the almost 150 communities within the districts through District Assembly meetings. Tailoring the programs to address the unique qualities of the communities, and secondly, engaging community members as principal participants in the projects, UNDP and the local facilitators were able to gain the community's trust, allocate responsibility to them and mobilize community leaders to disseminate information about the program. Some critical components of the implementation process was the fact that facilitators

would frequently visit the areas, talking with locals in the native language and letting them know the importance of the introduction of water and sanitation management into the community. Secondly, it was left up to the community themselves to then approach the facilitators to submit their requests for the bore wells and latrines (Dotse and Laryea, 2004). This method of introducing ideas and subsequently placing the burden to request the introduction of improved water and sanitation into the local communities was critical in developing responsibility and a vested interest into the project. Community committees were formed and these committees were key in creating awareness for the project and the dissemination of information. Women's participation, gaining the support of the chief of the community and local participation in building the facilities are just some aspects of the participatory design. For example, meetings with the community were held at the residence of the chief to set the example of the use of the latrines or training masonry for the hand pumps. Overall, from the inception of determining the community's needs through the District Assembly meetings to local facilitators building a rapport with locals through meetings and native language to allowing the community to request for the program to the following sustainable measures for information dissemination, this case from Ghana illustrates the usefulness of participatory appraisal and actions in order to make water and sanitation projects attractive to local communities and hence, sustainable (Dotse and Laryea, 2004).

Similar examples of the use of participatory appraisal and action in water and sanitation development are numerous. Such as the example in China on a water supply and sanitation project administered by the government agency, Ministry of Water (Ministry of Water Resources China, 2003). Village Participation and Health Promoters (VPHP's) were recruited and trained to carry out the objectives to improve the water and sanitation conditions. Several models of VPHP's were

used including a male in one case, a female in another case and a group of traveling VPHP's that go village to village. Additionally, Water User Associations were established amongst the community members to act as managers of the village's water and sanitation resources. The results of this project determined several issues that must be taken into consideration when using the participatory approach. Firstly, it was critical to make sure elites are not automatically put into the position to be either the VPHPs or completely comprise the Water User Association, through the process itself. In the case of locally forming the WUA, powerful community members may be in a position to take this task over, and hence, facilitators should ensure that participation should be spread out by gender and social position. Secondly, the approach must be well sequenced it is not a quick process to engage community members, but it is nonetheless more sustainable. The process should be monitored well and often cater to social aspects of the community (agricultural calendar) and it is important that the project deliver tangible results in order for the community to see the benefits of participation in the outcome of project. Additionally, information sharing must be transparent and all agents involved in the process should have clear and realistic expectation especially the community themselves (Ministry of Water Resources China, 2003).

The results from previous models of participatory action in sanitation highlight the usefulness of this approach in this complex development problem. Importantly, lessons learned from other examples of PAD add knowledge to those practitioners devising projects using participatory models. By incorporating community members into the development process, the levels of communication increase and the community can provide feedback and other necessary information to make the project successful. This study aims to illustrate how PAD is realized in the EcoSan project administered by SCOPE and how community participation has led to important

feedback to SCOPE and community awareness of the need to improve hygiene practices and also the EcoSan technology.

PAD/PHAST and EcoSan toilets

Given that more and more agencies are utilizing the PAD theory, it is only natural that those practitioners implementing EcoSan would also adopt this method. In 1991 composting latrines were constructed in two districts (Mwanza and Kwimba) in Tanzania. It was reported that none of the latrines in the households were in use and the system in the school was also rejected after some time. It took seven years for the people to start using the latrines that had been abandoned. Since that time, reports have indicated that users prefer the decomposing latrines in comparison to other types (Rwabigene, 2002). Various international institutions have subsequently sponsored a Participatory Hygiene and Sanitation Transformation (PHAST) program to create community awareness for the need for sanitation. This program has several stages and goals that recognize the process will be ongoing and will need tangible milestones to allow community members to actually transform over time. For example, field-based water quality testing was taught to the community. The test kits allow the user to test the water with certain products so they can visually see if the water is contaminated with fecal matter or if it is safe to drink. The tests use some bacterial substrates from excreta to control the result to the user. The results are displayed by the different color the water turns. This way the user is shown how the water will turn if it is contaminated or if it is safe, and they will recognize this by color (Rwabigene, 2002). It is in such activities as this example from Tanzania, that community members see the value of sanitation and in doing so create a demand for sanitation.

Another example of the PHAST model utilized for EcoSan comes from Mozambique. In the Niassa Province, Water Aid offered EcoSan as only one of several other sanitation options. Implementers decided to offer various sanitation options in the hope that community members would take to choosing the form they were most interested in. Two pilot toilets were built at the homes of two different community members. The two community members opted for two different styles of toilets. Subsequently, the NGO facilitated a PHAST discussion and demonstration at the sites of these pilot projects. The discussion focused on health related questions and misconceptions about the link between sanitation and diseases such as diarrhea and malaria. When community members were taken to the site of the pilot toilets, the facilitators explained the concepts and process on how it is used and additionally displayed the decomposed material and how it could be used. The demonstration was able to convince the community members to request the toilet. The implementing facilitators subsequently held further discussions with the new users to advise them further on use, the ways to use ash and answer any other questions. The implementers have also maintained constant monitoring and evaluation visits to the sites of these users, which they report indicate that the toilets are being used constantly and correctly. The implementers subsequently were trying to devise a monitoring and evaluation system at the local level as the idea spread and grew in size (Breslin, 2001).

Within the EcoSan toilet knowledge community such as ecosanres.org and the annual Ecosanitation Conference, it is a well-established fact that participation is one of the most critical factors in getting people to adapt to new technologies in sanitation. Furthermore, it is recognized that feedback from the community at all stages of the development process must always be taken

into consideration in order to cater the most effective implementation methods depending on community preferences. International institutions, NGO's, governments and local organizations have all been particularly adaptive to this information and have subsequently included participation in EcoSan toilet implementation and building awareness of the EcoSan technology.

Case Study

Kameshwaram

This case study will focus on the Kameshwaram area in Tamil Nadu where SCOPE has implemented 100 EcoSan to date. All 100 EcoSan toilets were demand driven, meaning the user requested the EcoSan toilet after hearing about it through SCOPE or SCOPE sponsored social marketing. The EcoSan toilets were built during 2006 and to date the ongoing monitoring by SCOPE is indicating that all the EcoSan facilities are being used. As of April 2007, SCOPE is planning on implementing another 200 EcoSan toilets before June 2007 in Kameshwaram based on demand from community members and positive feedback about the model of the EcoSan toilet.

Site Description

In census and other official data Kameshwaram is defined as a habitation within a defined revenue village. The village name is Tirupoondi- East, which is also the name of the Panchayat (a village based assembly/council that acts as a informal government). This village is located within the Keelelur Taluk, in the Nagapattinam District, Tamil Nadu. The census data collected is therefore reflective of the Tirupoondi East village statistics, and specific data is not collected in the census for Kameshwaram, except for population.

The area is located approximately 18 km from the main town of Nagapattinam (Babu, circa 2006). The area has a population of 366 men, 228 women, 41 boys and 150 girls (NGO Coordination and

Resource Centre, circa 2006). The coastal areas experience high population densities as the majority of the population is engaged in fishing activities. In the 2004 Tsunami, the area experienced significant damage and the fishing industry was particularly affected. There was generally not much reported on destruction to the agricultural sector. While the majority of the population is engaged in the fishing industry there are others who cultivate agriculture on their land. In non-fisherman's habitations, people generally live in houses close to their agricultural cultivations. At the time of the field research, many of the families engaged primarily in fishing were housed in temporary shelters very near the seashore. The construction of permanent homes was in the process at the time of my field visits.

The area is coastal with portions of farmland moving further into the interior in relatively low-lying areas. Kameshwaram is considered to have sandy soils and a very high water table. Given its coastal location, the water table is estimated to be approximately two meters below the ground. The land sits at a relatively low elevation, a characteristic that exacerbated the destruction of the tsunami in 2004 (Babu, circa 2006). There is a gentle slope in the land that slopes towards the coast, however, infrastructure development such as roads and houses interject the land's natural form (www.unesco.org, Date Accessed on Feb 15 2007).

Methodology

Data Collection Techniques

I conducted informal interviews with institutional facilitators from SCOPE and UNICEF, as well as community members involved with the EcoSan toilet. The field interviews were taken as part of the research and evaluation project being carried out for UNICEF, and hence, are being utilized in

this study as archival data. As per the approval of the Institutional Review Board at DePaul University (IRB), I am able to utilize this data as research that I did conduct and is valid for the purposes of this thesis. Since the research was conducted for the purposes of the UNICEF project, no written or verbal consent was required. Hence, I will not refer to any participants by name, either facilitators or community members, given that the research was not directly conducted for the purposes of this study. I will however, refer to the people who were interviewed by their professional title or that they were a community member using EcoSan toilets and utilize the data in the same capacity as its original purpose. Additional data was collected through email for additional information that was required to understand and evaluate the implementation model for the EcoSan toilet. The data that will be used in the thesis includes data provided by the NGO, SCOPE that was collected by myself during interviews with SCOPE personnel during the period of June-July 2006 and subsequently through emails during the period of April to May 2007. I was able to gain a significant amount of data and understanding from both my field visits and my subsequent emails with SCOPE that can be analyzed to determine the implementation model utilized by SCOPE for the EcoSan toilets and determine the importance of this implementation model determined to be PAD for the EcoSan project in the Kameshwaram area, Nagapattinam District, Tamil Nadu.

In order to evaluate the EcoSan implementation model utilized by SCOPE, I needed to find out information regarding how the concept was introduced into the community. The information needed was on how the EcoSan project in Kameshwaram was introduced through a pilot program and the subsequent phases after that. Critically, it was important to find out how the community members were made a part of the implementation process. The implementation process comprises

of activities beginning with technology design of the EcoSan toilet to building community awareness to evaluation and research through feedback from the community. Did SCOPE talk with them personally; did SCOPE demonstrate the EcoSan toilet though one that was already in use; did SCOPE give them information about the environmental and health aspects of the EcoSan toilet, are all questions that must be considered when determining the implementation model. Referring to the successful water and sanitation project administered by UNDP in Ghana, Dotse and Laryea (2004), identified as several key elements correlating with the success of the participatory model implemented. Firstly, the flexible approach of the facilitating staff throughout the project, engaging the community as principle participants, frequent visits for monitoring and feedback purposes and a general sense of trust and responsibility between the facilitators and the community members. Hence, when determining what information needed to be gathered, several questions were constructed to understand if the case of SCOPE also had these key elements. The example from the Ministry of Water Resources China (2003) highlights the question of sequencing and timeframe for introducing sanitation into a community and undertaking a participatory approach. Hence, for the purpose of this study, it was important to understand the timeframes and sequencing that characterized the participatory approach. The example given by Rwabigene (2002) of EcoSan toilets in Tanzania, illustrate the problems with use and adaptation to the technology. The example indicates the importance of demonstration and this case provides a background for finding out the specifics of the case of SCOPE. Hence, the literature provided and the prior examples referred to, gave a foundation for questioning and understanding processes and important elements.

As an indicator for the success of the participatory and PHAST approach, I needed to understand if the EcoSan toilet was supply-driven or demand-driven. Since it was quickly established that all the EcoSan toilets were demand driven, I endeavored to understand the relationship that exists between SCOPE and the community members. I also aimed to find out the information and support that is exchanged between the two parties and the levels of trust and interaction. In order to do that, I found out the process that SCOPE undertakes to build a relationship with the community, disseminate information and provide support at all stages of the EcoSan user's experience, even after several months. In order to do this, I spoke with the two SCOPE personnel including the Field Supervisor for Kameshwaram and the Project Director. Subsequently I also gained more information through email from the Director of SCOPE. Since all the interviews conducted with the facilitators from SCOPE were informal, many of the questions were similar or would be discussion based. The Project Director from SCOPE answered my questions on the technical aspects of the EcoSan toilet, explaining the design and the relation it was with the high water table in the area. Additionally, the Project Director from SCOPE provided the information about the schedule of implementation including the pilot EcoSan toilet, and the subsequent 100 EcoSan toilets to be built in Kameshwaram, how the idea of EcoSan is spread and the level of demand. The Field Supervisor provided a lot of information about the receptiveness of the community to the EcoSan toilet and was present with me during the interviews with the community members. The Field Supervisor also was able to discuss details about the ways that the idea of EcoSan was spreading, including information on the session where SCOPE screened a video and discussed with community members at the site of the pilot EcoSan toilet and through word-of-mouth in the community. I was able to ask the Director of SCOPE several questions relating to the larger picture of EcoSan and SCOPE, including where the funding for the projects

comes from, long-term sustainability of the EcoSan technology and the management involvement of SCOPE. The Director of SCOPE also provided information on the institutional relationships that SCOPE has formed with national and international organizations for collaboration on implementation, capacity building and research. Much of the rapport between SCOPE and the community members was also visually observed during my field visits where usually the Field Supervisor from SCOPE was present. These three representatives of SCOPE were all involved with the EcoSan project and had extensive knowledge on the various factors involved. Particularly the Field Supervisor and the Project Director were able to provide an ample amount of information specifically relating to the Nagapattinam District and the Kameshwaram project. The Director of SCOPE additionally was able to convey the overall approach that SCOPE undertakes relating to engaging the community with EcoSan and how the organization as a whole is developing its model to spread the technology and the implementation process.

The reason that informal interviews and participant observation was used is because EcoSan was a new concept to myself and hence this method allowed the data to be accumulated from learning about the concept to understanding the entire implementation model. Additionally, many discussions emerged during field visits, general meetings and in the course of discussion in related subjects. Additionally, conducting the research with SCOPE personnel in an informal manner allowed for their knowledge and information on EcoSan toilet and the model of implementation to be received naturally. While some questions were specifically addressed to certain personnel, the majority of information was provided from the discussion they gave after the initial question was answered. Hence, questions were structured to be open-ended and also allow the personnel to add any additional information. This technique was repeated while conducting the interviews with the

community members, where asking open-ended questions prompted them to answer the initial question and then continue with more specific information pertaining to their experience. Referring to the literature on participatory action in development, and the discussion between Chamber's and Kapoor, on understanding the hierarchies in place in a society and how that relates to one's capability to actively participate in the development process, I utilized a significant amount of participant observation where the SCOPE facilitators and the community members are both regarded as participants in the study. Participant observation allowed for close attention to be given to the role of women in the implementation model and additionally how SCOPE addressed any hierarchies in the society to allow for participation from all community members.

Evaluation Criteria

The criteria to determine if SCOPE is using a PAD/PHAST implementation model is derived from the literature on the various other EcoSan projects and the PAD/PHAST models. It was critically analyzed that these criteria was an illustration of the participatory model being used by SCOPE. The criteria is determined to be made up of the following factors:

1. Discussion with community users
2. Explanation of health correlation with sanitation
3. Explanation of environmental aspect and use of decomposed material
4. Demonstration of the toilet with an existing structure
5. Request from user
6. Labor investment during the construction process

7. Financial investment

These factors indicate the ways that SCOPE engages the community, listens to feedback or questions and creates a process that makes them integral parts of the project, socially and financially. The request from the user is the indicator that suggests the process is successful and the following actions display the continued effort to ensure the user is participating in the implementation, even after the request.

Given that the data was derived through interviews, I will analyze the responses from the EcoSan users through a qualitative approach. The implementation model is evaluated on subjective criteria that correlate success of the implementation determined by the future request for the EcoSan toilet. By taking into context the lack of sanitation, the high rate of open defecation and most importantly that knowledge that transitioning from open defecation to proper sanitation is a difficult task and many community members are resistant to this change, it can be analyzed and inferred that if a community member requests an EcoSan toilet, they are open to improving their hygiene and sanitation habits. I will utilize the criteria set forth by the WHO PHAST model to determine if the case of SCOPE is an appropriate example of PAD in EcoSan toilets. Furthermore, to determine the viability and the importance of the PAD implementation model I will describe the SCOPE model and illustrate how and why it has been able to expand rapidly over the past one year to involve now 100 households having an EcoSan toilet in Kameshwaram village and an additional 200 that are in the process of being built as I write this. The success of the implementation model is very much determined by the ability for SCOPE to have community members voluntarily ask for the EcoSan after hearing about it through social networks.

It must be noted that there are significant limitations to my data, given that EcoSan was a very new idea and did not have many users at the stage of my field research. I was able to conduct in depth interviews with two of the twelve EcoSan users that existed at the time. Additionally, I was only able to survey the EcoSan projects in the Nagapattinam District in the Kameshwaram area, while SCOPE has implemented EcoSan toilets in four other districts in Tamil Nadu. Hence, the conclusions that will be made to refer only to the Kameshwaram. The limitations of the study arise due to the lack of data on the use of the EcoSan toilet after a significant period of time. Subsequent research must be undertaken with these community members after a certain period of use to determine sustainability and the improvement of sanitation practices. The research provided is able to illustrate the implementation model utilized by SCOPE and highlight the request from the user as the foremost indicator that the community members want the sanitation system and it is not imposed upon them, and hence, they have taken an active role to participate in their sanitation management. The research demonstrates that SCOPE utilized a participatory approach that was guided by PAD and PHAST theories. The research however, is limited to assert any finding on the sustainability of the approach and the long-term adaptability of the EcoSan toilet and the transition from either open defecation or other sanitation systems to the EcoSan toilet.

Subject Population

During June-July 2006, I visited the EcoSan toilet sites several times in the Kameshwaram village in the Nagapattinam District in Tamil Nadu, India. During this period, the project was in the stage of advancing from pilot projects to wider scale. This area is a coastal area, but has some farmland

areas further away from the seashore and all these areas had been significantly affected by the tsunami of 2004. There was currently one EcoSan toilet that had been in use for six months during my first visit to the area. Almost two weeks later, on a subsequent visit to Kameshwaram, the construction of an additional 50 EcoSan toilets was planned and I witnessed one of the first of these 50 being built. On both occasions I had the opportunity to interview with the EcoSan participating community members (pilot user and the future user) and record feedback on their feelings on EcoSan toilets. In depth interviews were taken with these community members to gather information on how they heard about the EcoSan toilet, why they got the EcoSan toilet, and what previous sanitation practices they were using prior to the EcoSan toilet. Such questions were asked in order to understand the EcoSan idea in terms of the broader concept of sanitation and to gather a sense of as to why these community members were receptive to EcoSan. These questions were also asked to gather a understanding on how these community members felt about the local organization, SCOPE and how this influenced their decision and attitudes towards EcoSan.

During this period, I was also able to gather a large amount of data on the population's current sanitation habits. This data indicates that an overwhelming proportion of the population was engaged in open defecation. Given that this area had been affected by the Tsunami 18 months prior to my field visit, a significant number of people were housed in temporary shelters. I was also able to visit the seashore area where it was visible that the practice of open defecation was present, particularly among men. It was further indicated that open defecation was a common practice from the interviews I conducted for UNICEF on a separate study on hygiene in the tsunami shelters. I was also able to ask the numerous temporary shelter residents their attitudes towards adopting proper sanitation habits and it was established that while men may be more

resistance to transitioning from open defecation, should they have their own house and toilet (not shared) they would be more likely to transition from open defecation.

Furthermore, while the temporary shelters that were housing a significant population were large in number (over six different shelters housing a total of over 4000 people), it was a limited and constrained sample because I did not get the opportunity to observe and investigate the sanitation habits of equal numbers of people living outside the shelters. There is however a general consensus among the community members in the shelters as well as among the participants I interviewed who were living in more open farmland areas that open defecation is a very common practice and is the solution used in the absence of proper sanitation technologies. Many of the people reported that they were used to it and were slightly resistant to transitioning to other sanitation options.

Sanitation Problem

According to a UNICEF study in 2004, only 33% of India use adequate sanitation facilities. This percentage is made up of the 59% of the urban population and 22% of the rural population using adequate sanitation. Approximately 56% of the total population of Tamil Nadu lives in rural areas. Demand for sanitation is reported to be low and only 14% of rural households have adequate sanitation (www.unicef.org, Date Accessed Jan 20 2007). Throughout the Nagapattinam District, septic tanks are a common form of sanitation. However, given the rural nature and open spaces of villages and communities, open defecation is widely practiced in the absence of appropriately facilities. Often field areas near habitations or the seashore are the locations that people utilize for open defecation. There is limited data on specific health problems related to poor sanitation for this area, however, overall in India the main water-borne diseases are diarrhea, trachoma, hepatitis and intestinal worms. India has an overall high rate of bacterial contamination of surface water, and human waste accounts for approximately 80% of this problem (Government of India, 2002). Additionally, it is estimated that 90% of rural areas throughout the country rely solely on both ground and surface water that is not treated.

Acute diarrheal diseases are endemic throughout the state and outbreaks of cholera are common in most parts of the states, particularly during the monsoon season and summer. This situation was severely exacerbated by the Tsunami in 2004. Noticeable is that deaths from cholera are few, and deaths from acute diarrheal disease is relatively high. Additional information is required to understand why deaths from diarrheal diseases are significantly more than cholera and the factors

involved. (Health and Family Welfare Department: Government of Tamil Nadu, www.tnhealth.org, Date Accessed Jan 30 2007).

The table below indicates the severity and persistence of the problem.

Year	Acute Diarrheal Diseases			Cholera		
	Cases	Deaths	Fatal rate	Cases	Deaths	Fatal rate
1997	78,025	520	0.67	2,261	2	0.09
1998	77,677	368	0.47	1,807	0	0.00
1999	74,583	266	0.36	1,807	1	0.06
2000	64,130	195	0.30	1,328	1	0.05
2001	59,511	159	0.27	1,110	1	0.09
2002	69,889	199	0.28	1,591	3	0.19
2003	58,784	66	0.11	3,90	1	0.26
2004(Jan-Nov)	69,807	101	0.14	1,390	2	

Figure 7. Source of Table: (Health and Family Welfare Department: Government of Tamil Nadu, www.tnhealth.org Date Accessed Jan 28 2007).

Intervention: Description of SCOPE EcoSan model

Technical Design

Technical design of the EcoSan toilet implemented in Kameshwaram are based on consultation between SCOPE and various institutions and experts, as well as feedback from users. The EcoSan model that is being discussed in this study is the two-drop-hole urine-diverting model. The model was designed by SCOPE and has evolved since its introduction after feedback from users. SCOPE reported that users from initial pilot projects in other parts of Tamil Nadu, indicated that they desired the two-drop hole version, which requires only minimal use of water for personal washing. This water is collected in a small hole behind the two main holes for solid and liquid waste. The first model of EcoSan designed by SCOPE, collected the water used for personal washing and the liquid excreta through the same hole and piping. However, the updated and evolved model that collects liquid waste separately to the personal washing water was used for all the EcoSan toilets in Kameshwaram, and is now the model utilized by SCOPE. The users for the EcoSan utilize the same drop-hole for approximately six months, adding ash after each use. Once it is filled, it is covered with a concrete slab and allowed to decompose for the next six months, at which time the users use the other drop-hole. The back of the EcoSan toilet has a concrete slab that is fixed for easy removal during pit-emptying times. The slab is attached with 90% sand and 10% cement and can quickly be replaced after the pit emptying.



Figures 8 & 9. Pictures provided by SCOPE of the opening of the first EcoSan toilet in Kameshwaram. Present in the picture are SCOPE, UNICEF and DRDA along with community user. Taken in May 2006.

Implementation Model

Central to the model of marketing and implementing of EcoSan by SCOPE is to make sanitation and the EcoSan technology demand based. Rather than giving sanitation solutions and unknown technologies to users, SCOPE focuses on creating awareness in the communities for the need for sanitation and additionally the concept of EcoSan as a possible solution. The SCOPE implementation model is based on phases, that ensures ongoing assessment, monitoring and feedback from all actors involved in the process. These actors include SCOPE personnel that is involved in technical toilet design, community liaisons, masons involved in the construction and EcoSan users. The steps involved in ensuring implementing EcoSan are as follows:

Technology design → Pilot Project → Community Awareness → Community Marketing → User request → Building Process, Community Involvement → Training → Community Feedback/Monitoring → Research studies.

In the area of Kameshwaram, the first phase was the pilot project that began in May 2006. The first EcoSan toilet was built on the property of the vice-president of the Panchayat, a married woman with two children. Her role in the community as the vice-president of the Panchayat and as a woman, were critical components in building awareness and legitimacy for EcoSan toilets. Not only does she have an influential position in the Panchayat, but she also serves as an important social networking resource for spreading the idea through word-of-mouth with other community members, particularly women.

After a few months of the pilot project, SCOPE proceeded to phase two. This would include the construction of 100 more EcoSan toilets in the Kameshwaram area. The vice-president of the Panchayat was convinced of the success of the EcoSan toilet and collaborated with the local government district officer, and funding partner UNICEF, to expand EcoSan in this tsunami-hit area. SCOPE worked within the limited of the funding they had available and the funds given by other partners, such as UNICEF and the government to determine deadlines for implementing this phase and the size of the project. One reason EcoSan has been particularly so focused in Kameshwaram is because the area was effected by the tsunami and hence, several sources of funding are available for reconstruction and long-term rehabilitation of the area. SCOPE has specifically received funding from the Friends in Need Trust (FINT) and UNICEF to invest directly into EcoSan project in Kameshwaram. Additional funding has also been made available from the government of roughly 25% of the total cost of each EcoSan toilet.

In order to receive 100 requests for EcoSan, SCOPE engaged in building awareness and marketing amongst the community members of Kameshwaram. In July 2006, SCOPE held a video presentation of the EcoSan toilet at the house of the first pilot project, the woman who was the vice-president of the Panchayat. SCOPE asked her to ask families from the area to be present at her house for the video presentation. Fifty families were present at the video presentation of the EcoSan toilet that showed the concept, how it should be used and how the decomposing element works. SCOPE engaged in discussions with the community members to explain the benefits of EcoSan in terms of the environment, dignity and health. Additionally, SCOPE discussed the cost element, which involved a subsidy portion that amounted to 75% of the cost, and the additional 25% that would be borne by the user but funded through a loan granted by SCOPE. At that

presentation, all 50 families requested the EcoSan toilet. Additionally, SCOPE asked the community members to spread the word about EcoSan to other families. Subsequently, the next 50 EcoSan toilets were requested over the next month allowing SCOPE to fulfill phase two of the project in Kameshwaram. During my field visit, one of these first fifty EcoSan toilets was being built. I visited the site with SCOPE personnel to see how this building process occurs. The SCOPE official discusses with the new user who has at least one family member present during the construction process. At this time, the SCOPE personnel received a call on his cellular phone from another community member who had heard about the EcoSan toilet from somebody who was at the video presentation and wanted to also get an EcoSan toilet. SCOPE has reported that the demand was received from people who have no suitable toilet facility or were in the process of open defecation. The demand has been particularly high in this coastal area because people have been unsatisfied with other toilet models and they understand the problem of the high water table.

While there has not yet been formal research conducted on the sustainability of the EcoSan toilets amongst these users in Kameshwaram, SCOPE has maintained constant contact with EcoSan users. SCOPE reports that from the observatory contact, there have been no cases of people not using the EcoSan toilet. Additionally, SCOPE works with the EcoSan user to establish kitchen gardens to grow fruits and utilize the urine collected and the decomposed solid waste on agricultural fields. SCOPE is continually visiting EcoSan users to demonstrate support and gather feedback on the EcoSan model and its user and maintain the organization as a resource that the people can turn to should they encounter any problems or have concerns. Hence, SCOPE has built up a significant reputation in the areas in which it works in. In the Kameshwaram area, along with

UNICEF, SCOPE has a well-established reputation with EcoSan and as a community organization.

In March 2007, through my subsequent correspondence with SCOPE, they advised me that an additional 200 EcoSan toilets would be built in the Kameshwaram area over the next three months. Sources of funding for tsunami-related projects that SCOPE is receiving from UNICEF will end June 2007 and this is one of the other reasons the volume of requests for EcoSan is significant. For these 200 EcoSan toilets, requests have already been fulfilled and SCOPE attributes this to the previous marketing, discussions and overall community knowledge of EcoSan and SCOPE. In this second batch of EcoSan toilets, SCOPE believes that everybody knows at least one family who has an EcoSan toilet from first batch of 100. Hence, they view the social marketing as successful and sustainable. Awareness and training is still given to these families and the new interested families are taken on a one-day trip to hear from an existing EcoSan user, show them a functioning toilet and answer all the doubts and questions the interested families may have.

SCOPE is currently planning to conduct formal research in conjunction with its funding partners UNICEF and others. Amongst the proposed topics of research are the testing of composted waste and urine. Additionally, a current study is being undertaken to determine the factors that influence the use of EcoSan by the French FIR Trust. Nonetheless, primarily feedback from SCOPE indicates that awareness is strong in Kameshwaram and word-of-mouth marketing between women is one of the most influential factors in awareness and demand. While more demand is coming from women, they indicate that this is because women are usually more involved in familial matters especially sanitation and health; however, many times demand is coming without

distinction from the family as a whole. It is clear that SCOPE has been able to establish the organization in Kameshwaram and through their marketing, discussion and social networks the EcoSan idea has garnered significant interest and created demand for EcoSan toilets.

Discussion

The discussion of the SCOPE implementation model for the EcoSan project will be undertaken by addressing the criteria for success derived from the PHAST model. The data discussed below is derived from my interviews with the two EcoSan users in the Kameshwaram area. Family #1 is the pilot project that comprised of the woman who was the vice-president of the Panchayat and the rest of her family. Family #2 is comprised of a male and female who were building the EcoSan toilet at the time of my interview during phase two of the project (the 100 EcoSan batch). There is also significant information included from interviews and data provided by SCOPE personnel.

Discussion with community users

I observed strong interaction between SCOPE and the community members. It was apparent that the SCOPE personnel were making a concerted effort to build a relationship of access and trust. A major observation of the SCOPE model was that it was designed to answer any questions or concerns community members may have about the EcoSan toilet. Due to the nature of SCOPE as a local organization, and further its association with UNICEF, which many community members were already familiar with, SCOPE established itself amongst the community as an organization committed to sanitation improvement.

In May 2006 a pilot EcoSan toilet was built on the property of family #1. The family included both a wife and husband with two children under the age of 10 (girl and boy). The mother was the

vice-president of the Panchayat. She had a separate cooperative initiative sponsored by another NGO, where she had set up a tailoring school on her property. This family was chosen to be the pilot test case for the EcoSan because SCOPE personnel were familiar with the mother and SCOPE indicated that she showed openness to change and new ideas for development. Furthermore, as the vice-president of the Panchayat her role in the community is respected and seen as a highly influential source amongst community members. Hence, this family agreed for the first EcoSan toilet to be built on their property for their private use.

During my second visit to the pilot project, the mother spoke about her interactions with SCOPE. She talked about her role in spreading the knowledge about EcoSan toilets to the rest of her village. It was clear that her experience with EcoSan was positive and subsequently her role in marketing the technology was a critical component of the implementation project managed by SCOPE. She spoke about an event that had been held at her house, only a few weeks prior to my second visit to the village. The meeting was a SCOPE sponsored event that was designed to build awareness of the EcoSan toilet amongst the community members of Kameshwaram village. She had organized 50 families from her village to gather at her house and screen a video about the EcoSan toilet. SCOPE had provided the video and television. She also showed them her EcoSan toilet and advised them that she had been using it for the past couple of months. At the site of family #2, the male reported that he was a farmer, in the profession of growing groundnuts, rice and vegetables. He said that when he saw the video at family #1's house he liked the idea of EcoSan. Previously he and the rest of his family were practicing open defecation. He said all five members of his family, including himself would start using the EcoSan toilet "at least for now." One particular motivation he cited was the safety factor. He reported that previously his wife felt it

dangerous to go to far out into the field for defecation after dark hours. The EcoSan toilet would allow her now being able to go to the bathroom at her convenience and not be forced to only go to the toilet during daylight hours. This issue also arises the idea of dignity, particularly among women, who do not need to feel constrained to plan their toilet usage by time of day, safety or privacy. These issues are of particular importance during the social marketing process, as women interact with other women in public and private spheres of life and are likely to discuss issues of their sanitation and hence, the concept of EcoSan.

Through the video presentation and furthermore the discussions with potential users, SCOPE is placing the effort of understanding the concepts of EcoSan toilets on the community member. They explain how to use the EcoSan toilet, and which hole is for solid or liquid excreta. Additionally, they inform them it is necessary to add ash to the solid waste hole. Generally, community members have ash collected from the firewood they use for cooking purposes. This is a critical step that must be explained, and an indicator of successful behavioral change. Hence, SCOPE maintains that explaining the concept of EcoSan toilets and how it is used and maintained will allow the potential user to make up their mind for themselves regarding whether this technology is something they are willing to consider. By utilizing the vice-president of the Panchayat, who was also a woman, SCOPE created the opportunity to spread the idea of EcoSan through community interaction. This form of discussion and communication that originated with SCOPE, gained further legitimacy because it was carried out through the community members themselves.

Explanation of health correlation with sanitation

Given that SCOPE asserts that a significant number of the potential users are in the habit of open defecation, promoting EcoSan technology involves some element of promoting hygiene transformation and better sanitation practices in the interest of health. Promoting EcoSan toilets as a viable option for their health and well-being is important for the technology and behavior transformation to be deemed sustainable. The PHAST model rests on understanding health issues as the key factor in successful sanitation transformation, and SCOPE has proved to be significantly influential in explaining the health problems of open defecation. It is common for SCOPE to use visual aids in trying to convey the health benefits of proper hygiene. For example, often calendars, stickers or posters are used during the demonstration are given to the community members. These visual aids have pictures of better hygiene practices such as hand washing, toilet use, garbage disposal or safe water storage. By conveying the message of better hygiene practices through visual aids and with specific discussions, the community member is able to think about their hygiene behaviors and how it may relate to their health conditions.

Often SCOPE personnel will ask the community about their general health condition and if any members in their family experience illnesses such as diarrhea or fever. Generally a discussion about the importance of proper hygiene practices, particularly proper toilet use, would follow this question. Given that discussing toilet habits with community members was not an easy task, often what was reported seemed unreliable since people were embarrassed, especially the men. Hence, when asked specifically who in the household was using the EcoSan toilet, the woman from family #1 responded that all the family members, including the husband and two children were

using the EcoSan. Given that this is her response it can be taken at face value, but with the consideration that often people are not completely truthful. On a subsequent visit to family #1, I spoke with the mother again and visited the family's EcoSan toilet. The EcoSan toilet appeared to be in use and additionally well maintained. She reported that all the family members were using the EcoSan toilet completely and for all purposes. It was important for SCOPE to deliver information to the community that would allow them to understand the link between improving their hygiene practices and improving their health. Therefore, should community members see the value in improving their hygiene practices through using an EcoSan toilet, they are able to make the decision and request the technology to be built for their use.

Explanation of the environmental aspect and the use of decomposed material

The significance of the "kitchen gardens" that SCOPE has encouraged EcoSan users to maintain is another part of the process to engage community members and allow them more involvement with EcoSan. SCOPE personnel demonstrate and explain to the users how to use the collected urine on the garden to grow fruits and allow the users to determine if they will either consume the fruits or sell them. An understanding of the "close-the-loop" is garnered through this process because EcoSan users may come to value the decomposed material because it can be reintroduced into the eco-system and the environment. At the time of my first visit in June 2006, the pilot EcoSan toilet with family #1 had only been in use for a couple of months. At this stage, during an interview with the mother, she did indicate initial hesitation about the process of using the EcoSan toilet-particularly the process of adding ash into the solid waste hole. Nonetheless, she reported that after sometime she got used to it and realized that the EcoSan toilet did not smell, did not look dirty and

was fairly easy to clean. Community members generally have ash collected from their own resources or from the firewood they use for cooking. Hence, a central part of explaining the process of decomposition relies on SCOPE explaining that the ash must be added into the solid waste drop hole on a daily basis. SCOPE ensured that community members had access to ash, and realized its use and necessity in the EcoSan toilet. At the time of pit emptying, SCOPE ensures that the user gains additional confidence in the EcoSan technology and becomes convinced that the decomposed material is safe for use as fertilizer. Masons trained by SCOPE conduct this process in the presence of the EcoSan user and SCOPE personnel. This process limits handling of the excreta by the user and also exposes them to witness that lack of smell of the decomposed material. At this stage, since the removal of the back slate of the EcoSan toilet is a new procedure, SCOPE is present for the majority of pit emptying instances. However, SCOPE also reports that some community users have been able to conduct this process on their own. In terms of sustainability of the emptying process, SCOPE provides the EcoSan user with a manual on how to remove the back slate and replace it.

For the liquid urine waste, SCOPE discusses with the user on how to use this as fertilizer by arranging for the user to set up a kitchen garden to grow fruit and subsequently illustrating how the liquid waste can be utilized to enhance the growth. Additionally, since many of the community members who live in Kameshwaram area are engaged in agricultural activity, the use of the recycled waste could also be a motivation for them to use the EcoSan toilet. I witnessed interaction between SCOPE and some community members where the SCOPE personnel had a small jar of the decomposed waste and had opened it to display the texture and smell of the fertilizer. The male in family #2 said he plans to use the compost on his banana tress. He

previously did not understand the concept of using the fertilizer product on plants, but now understood the process and plans to try it out. He came to this conclusion after discussions with SCOPE personnel on the safety of the fertilizer and the benefits it can have to growing produce. The issues and questions related to handling and reusing human waste are addressed through such demonstrations and discussions. SCOPE reports that it is not always a quick process, and often some community members prefer to sell the produce from their kitchen gardens rather than consume it themselves, [due to the reason that] it was grown with the EcoSan fertilizer. SCOPE believes if it can establish from the first pit emptying the ease of the process and how the decomposed material can be utilized safely as fertilizer, the EcoSan user will see the benefit in the overall technology and develop a desire for the decomposed fertilizer to use on their kitchen garden or other agriculture, then the EcoSan toilet can become sustainable in the long term. Hence, SCOPE will not need to be present or organize subsequent pit emptying services, as the community members will be motivated to utilize the fertilizer, and additionally have the knowledge and manual on the easy removal and reattachment of the back slate to remove the decomposed material.

Demonstration of the toilet with an existing structure

All community members who display interest in the EcoSan toilet are taken to see an existing structure in use before they get their own. In the case of the group presentation at the home of the pilot project in Kameshwaram or by SCOPE personnel taking a new user on a day trip to a site where there is an existing EcoSan toilet, the community member is able to see first hand the process and the structure of the EcoSan toilet and ask any questions they might have. As Paul

Calvert (2006) argues, “seeing- and not smelling is believing,” referring to his years of experience in sanitation transformation whereby people must be comfortable with the technology to embrace it (cited in Panesar, 2006). Should people have any reservations about the cleanliness of the EcoSan, when they are able to experience that there are no bad odors or smell from the drop holes, they can take this into consideration in their decision to adapt to the technology. In taking the time to show the interested community member an existing EcoSan toilet, SCOPE is able to build trust and confidence. The community member may find the whole experience new and interesting and hence be more inclined to be a part of the EcoSan project. SCOPE reported that at the presentation that was held at the site of the pilot project, all 50 families were very excited and eager to get the EcoSan toilet. Additionally, by taking an interested user to an existing EcoSan toilet, they are able to interact with other existing users and gain a better understanding of the process, its benefits and as well as the problems that may arise. By ensuring that every EcoSan user has actually seen an existing EcoSan toilet in use, allows SCOPE time to build confidence with the EcoSan technology and gain the trust of the community member.

Request from user

In the Kameshwaram area, all 300 EcoSan toilets have been built or are preparing to be built at the request of the user. This demonstrates that the discussion and demonstration process has led to placing the incentive for sanitation in the hands of the community members. By making EcoSan demand driven, two factors can be hypothesized; i) the community member is willing to transition from their previous sanitation habits, whether it being open defecation or some other type of latrine, and ii) that the community member is open to trying the concept of the EcoSan toilet. With

an interview with the supervising SCOPE personnel, I was advised that all 50 of the families present at the video screening requested the EcoSan toilet immediately. As discussed previously, when I was at the construction site for family #2, the SCOPE employee received a call on his cell phone from a community member that had heard about the EcoSan toilet and was requesting one for their property. This situation illustrated the familiarity that the community had with the local SCOPE personnel. Also, the both SCOPE and the community had high levels of access for communication and interaction between each other. I also observed that the process to get an EcoSan toilet was not plagued with any kind of bureaucracy with a detached organization, but rather SCOPE made the entire process very informal and focused on community building. Such was the case for family #2, who had heard about the EcoSan toilet from the video screening and immediately requested it for their property. These community members all had legal title to their land and hence had the added benefit of investing in their property. Through my interviews with community members who had been displaced and living in temporary shelters, many said that when they had their own property they would like permanent toilet facilities. They indicated that once they are able to assert ownership over their land, they saw the benefit in adding a toilet facility, as it would be under their control and ownership. Hence, when understanding the motivations of the EcoSan request, I understood that the community members found some value in the technology and that it met at least one of their needs, whether it was safety, ownership, improving health or the use of the fertilizer. By putting the onus on the community member to make the request for EcoSan, it allows SCOPE to facilitate the EcoSan project, but ultimately leave the decision and desire to participate in the hands of the community members.

Labor investment during the construction process

While SCOPE does not require the EcoSan user to directly contribute to the construction process, there is always at least one member of the family present during the construction. Labor contributions can be another way to encourage participation and allow users to feel they are taking their sanitation situation into their own hands. Nonetheless, the EcoSan user is able to make some suggestion to the location of the EcoSan toilet on their property. SCOPE reported that at least one member of the family is likely to be present during the construction process allows them to understand what is going into building the EcoSan toilet and had been the case thus far at the time of my visit. Generally since most people are engaged in either agricultural or fishing activities, they are likely to be at their home at some point during the day. Additionally, since the EcoSan toilet takes approximately one week to build, the user can see the progress over the course of that week. Further research is required to determine the role of the EcoSan users in the construction process to date. It will be necessary to see if community members are engaging more in the construction process by contributing their labor or maintaining a presence during the construction process.

Financial investment

The SCOPE EcoSan project requires all users to make a financial investment in the technology. Nonetheless, the user is aware that financial contributions have also been made by SCOPE and government funding, and hence can see the financial arrangement as one that is collaborative. By ensuring that the community member makes the financial investment, a significant amount of

interest in utilizing that investment is then borne by the EcoSan user. Each EcoSan toilet costs between Rs/~ 6000 to Rs/~ 9000 (approximately USD\$133 to USD\$200), depending on transportation costs determined by location. As previously mentioned, the way the cost is borne is through a collaborative effort between the government, SCOPE and the community member. The government contributes approximately 25% of the cost. The remaining 75% is borne 50% by SCOPE and 25% by the community member. Generally, the 25% borne by the community member is paid through a loan, provided and administered by SCOPE. Since SCOPE gives the EcoSan user a loan to pay for their portion of the EcoSan toilet, this also ensures that the user is reminded of the investment each time they make the payment back on the loan and keeps the relationship between the EcoSan user and SCOPE in close contact. Further research is required to document the payback rates, different payback schedules and any loan default problems.

Conclusion/Recommendations

Kameshwaram is being regarded as a “model EcoSan village” in the tsunami-hit area of Nagapattinam District of Tamil Nadu, India. It is clear that, combined with the available funding for rehabilitation and the desire by the government and NGO’s to “Build Back Better,” the focus on sanitation improvement has been made a priority. Additionally, sustainability has been a center point of rehabilitation, particularly with respect to sanitation solutions. EcoSan toilets have been adopted as one concept that addresses the environmental characteristics of this coastal area. The high water table is the primary consideration that makes EcoSan toilets attractive and a viable solution for these populations. Furthermore, it provides a relatively low-cost solution to sanitation in a spread out rural area where common systems such as septic tanks or sewage systems are more costly.

The implementation model for EcoSan toilets is a critical factor in community acceptance. Beginning with the initial discussions with a potential pilot EcoSan user, which SCOPE chose to be an influential member of the local Panchayat of Kameshwaram, to the subsequent discussions and training given to the rest of the community on EcoSan, SCOPE has been able to garner interest about EcoSan toilets. By making the process of attaining an EcoSan toilet demand driven, SCOPE is capitalizing on the PAD/PHAST model and allowing community members to take their sanitation situation into their own hands. Furthermore, my research and contact with the EcoSan project in Kameshwaram indicates that SCOPE has developed a reputation and relationship with the community members through frequent visits, answering questions at all stages of the EcoSan project and advising them on the maintenance of the kitchen gardens.

In order to truly assess the success of the SCOPE EcoSan project and to evaluate whether the PAD/PHAST model of implementation was effective will require substantial research on whether community members are continued the use of the EcoSan toilet. It must also be determined if EcoSan is a long-term sanitation habit, or if it is a transitory technology. Such future research could provide a preliminary insight into pursuing an answer to such a question, and could even be the first stage in long term research on the sustainability of EcoSan toilets. The PAD/PHAST model is adopted by organizations on the belief that those who are affected by the intervention should in fact contribute and take on the responsibility of change in order to create sustainable models. At this stage, SCOPE does not foresee any problems with sustainability of the EcoSan toilet project in Kameshwaram, and cite previous EcoSan projects in other villages in Tamil Nadu such as Kaliyapalayam, that have been in use for over two years without constant assistance from SCOPE. Future research will be able to either prove and disprove this prediction and characterize the sustainability of the EcoSan in Kameshwaram.

This study aimed to explore the SCOPE EcoSan project in the Kameshwaram area of Tamil Nadu, India, as a model of PAD/PHAST and sanitation management and contribute to the field of participatory action in development. Through my observations and interactions with SCOPE, it became clear that SCOPE had adopted a PAD/PHAST model of implementation to carry out the EcoSan project. The fact that this was a tsunami-hit community should be considered in terms of the increase in allocated funding for development and sanitation projects and public attention on the rehabilitation process. The Indian government's initiative promoted as "Building Back Better" is manifested in the increased funding and desire to improve the overall living standards in the

tsunami-affected areas. In context of this study, the case of EcoSan toilets in Kameshwaram, Tamil Nadu, contributes to the knowledge community on PAD/PHAST and provides a practical example of the theory that can be used in future research or development of implementation models.

Additional research can be undertaken to understand the benefits of EcoSan toilets over other systems in a coastal area with a high water table. Sanitation has the potential to improve environmental and health aspects of a community and EcoSan toilets are one way to achieve this goal. The process of sanitation improvement however is more than just building infrastructure; it is about community attitudes towards sanitation practices and the knowledge they have. The PAD/PHAST model utilized by SCOPE was effective in garnering knowledge in the Kameshwaram community about sanitation as a whole and EcoSan toilets as a possible technology for use. The model was able to make the process demand driven and created a situation where community members were spreading their experience with EcoSan to others and overall allowing a greater amount of discussion around sanitation improvement and the benefits of EcoSan toilets.

Further research documenting the implementation model of SCOPE can provide additional insight into the ways to create behavioral change in terms of hygiene practices and more detailed information about the specifics of community participation in sanitation management. Sanitation management needs to advance research on various implementation methods and technology solutions and how the two can coordinate to improve hygiene and overall community health. Given that this study aimed to serve as exploratory research and documentation, additional interviews and monitoring is required of the EcoSan users, with a larger sample of Kameshwaram

residents. Furthermore, feedback over a longer period of time from SCOPE will provide valuable insight into any changes in the implementation process that the organization undertakes, and the reasons for the changes. A comparison with a top-down approach that does not use participatory action in the EcoSan project could also provide additional value to the documentation of EcoSan toilet implementation. Participation in development programs is gaining momentum and there is increased dialogue amongst governments and development organizations that a participatory approach creates a sustainable solution to various problems. The residents of Kameshwaram are demonstrating that they are interested in having a stake in the development of their community, and the EcoSan project administered by SCOPE acts as a precursor to further development projects with community participation. This study illustrates how facilitators and community members can both participate in the development process, and the importance of this coordination particularly relating to sanitation projects and behavioral change.

Appendix

List of informal interview questions conducted in Kameshwaram between June-July 2006, and follow-up questions through email with SCOPE.

Director of SCOPE

How many EcoSan toilets have been built

Which districts?

Follow up information on the success of the toilet; Are people using it properly?

How many EcoSan toilets have been built in Kameshwaram?

Why is the EcoSan toilet beneficial? Also, what districts within Tamil Nadu are the EcoSan toilets built??

Did SCOPE implement the EcoSan projects in Phases??? Phase I, Phase II, etc.... if so, what was generally involved in these Phases- from Pilot project to wider scale?

Do you have any interviews or testimony from users of the EcoSan toilets??

How is SCOPE spreading the word about EcoSan with the community members??

Do the participants have to request the EcoSan toilet always, or is it sometimes offered?

Is there funding/loan provided to the participants?

Which group of people seems to be adapting to the EcoSan the best? Fisherman, Farmer, Masons??

Is SCOPE planning on conducting any evaluation on how the EcoSan is being received and adapted to?

How did SCOPE come to be involved with EcoSan? Was it to do with Paul Calvert- does he have a patent on the EcoSan toilet? Or did SCOPE design the toilet? How did you become in contact with foreign organizations that are supporting SCOPE with information and funding for EcoSan??

Project Director for SCOPE

How is the EcoSan toilet used?_What areas is it good for?

Where do the EcoSan users get the ash from? Do they buy it themselves, where? or does SCOPE give it to them initially, and after that, where from? Do you discuss with them how to use it and why?

Also, when the waste is decomposed, who is responsible to remove the waste from inside the structure? Is it a mason...hired by SCOPE??? or does the user do it themselves? Who will replace the brick where it has been broken to remove the waste from inside? If the user is responsible, how can you ensure that they do it....and won't just abandon the EcoSan toilet after some time?

How does SCOPE plan to maintain the EcoSan toilets after a duration of time-----in order for the project to last, will SCOPE continue to monitor use for years to come, and provide ash....mason's to remove decomposed material?

Can you explain the EcoSan project in Kameshwaram?

Field Supervisor for SCOPE

Why did SCOPE choose this house for the pilot project?

Are community members interested in the idea?

Have they been using open defecation previously?

Are more EcoSan toilets going to be built in Kameshwaram?

Which community members seem more interested in EcoSan?

Community member from Family #1 (Pilot users)

How long have you been using the EcoSan toilet?

What was your previous sanitation practice?

How do you feel about the composting process?

How do you feel about the fertilizer and using it?

Have you told others about the EcoSan toilet?

Do all the members in your family use the toilet?

Do you plan to continue to use the toilet?

Community member from Family #2 (part of Phase II)

How did you hear about the EcoSan toilet?

Why did you want to get an EcoSan toilet?

Will all the members in your family use the EcoSan toilet?

Will you maintain the toilet?

What will you do with the fertilizer?

Have you told others about the EcoSan toilet?

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5/30/2008
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