sustainable sanitation alliance

Case study of sustainable sanitation projects

Promotion of double-pit urine-diversion toilets, Sabaithuwa, Parsa District, Nepal - draft

Fig. 1: Project location

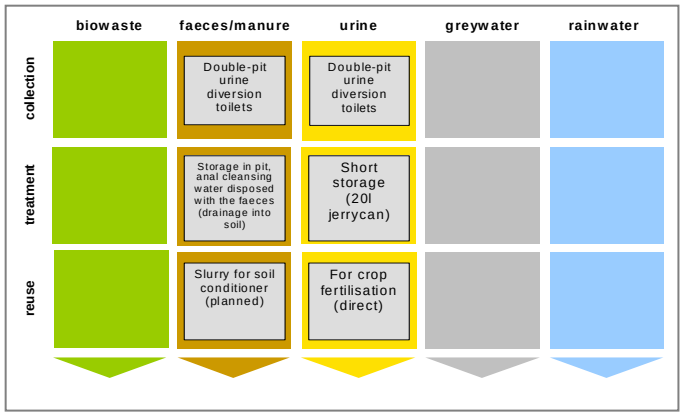

Fig. 2: Applied sanitation components in this project

1 General data

Type of project:
Pilot project in rural area

Project period:
Planning and construction: Jan. to Dec. 2005
Operation: from Dec. 2005 onwards

Project scale:
First phase (in 2005):
20 toilets (double-pit urine-diversion toilets)
Second phase (during 2006-2007):
80 toilets and mobilization (number of users: approx. 360)

Phase 1 budget: 11,200 Euro
Total budget: 25,900 Euro (NPR 2,410,498)

Address of project location:
Sabaithuwa, Parsauni Birta Village Development Committee (VDC), Parsa District, Nepal
)

Planning institution:
Department of Water Supply and Sewerage (DWSS), Kathmandu, Nepal

Executing institution:
Community Development Forum (CODEF) in collaboration with local Jyoti Youth Club

Supporting agency:
WHO (financial),
DWSS (technical)

Open questions:

- *Number of users for first phase in 2005?*
- *Which part of the WHO? Which scheme?*
- *Is the total budget the sum of budget phase 1 and 2?*
- *The number of toilet users after phase 1 (also after phase 2?)*

2 Objective and motivation of the project

The main objective of the pilot project was to improve the local sanitation situation in Sabaithuwa village. This was done by introducing the concept of urine and faeces reuse in agriculture and by assessing the acceptance and potential benefits of reuse in this particular community.

The increased use of latrines is expected to have a variety of health benefits, especially in terms of a reduction in diarrhoeal diseases and helminth infections and to improve nutrients recovery from human excreta.

The project was envisioned as a pilot project, as it was the first Ecosan project in the Terai region of Nepal. It was also expected to assess the acceptability of the toilets regarding technical, financial and cultural aspects in order to overcome drawbacks from previous projects conducted in other areas and to develop an appropriate technology that could be further replicated and scaled-up in the country.

As the Terai region of Nepal is predominantly Hindu, with a substantial Muslim minority some doubts about willingness of people to consider Ecosan existed. The pilot was intended to show the Terai population the benefits of Ecosan and to evaluate social acceptance.

3 Location and conditions

Sabaithuwa village is situated in the lowlands plain Terai, which is situated South of the foothills of the Himalaya. The region is affected by the monsoon. In Kathmandu, the average annual precipitation is 1394 mm and the average annual temperature is 18.7 ℃. The region has a hig h density of rivers which are mostly seasonally, with the resulting soils in the Terai being alluvial with a fine to medium texture.

The population density in Terai lies about 343 inhabitants per square kilometre. Sabaithuwa village is located in the Parsa District, close to the town of Birganj. It consists of three wards and together with two other villages (Parsauni and Itiyahi) makes up Parsauni Birta Village Development Committee (Fig. 3). Sabaithuwa has 265 households and a total population of 1,590 people. In average there are 6 persons

per household sharing one urine diversion toilet. The village is dominated by Koiri and Adhir ethnic groups (60 %), and has approximately 20% Muslim residents. The majority can be found in the Kohir caste which determines people to be vegetable growers.

In Sabaithuwa village, 23% of households have a simple pit latrine and open defecation is still the norm amongst many villagers. The drinking water in Sabaithuwa village comes from dug wells and tube wells. On average, the distance from a tube well to a household 100 meters and approximately 5-6 households are sharing each water source. Nevertheless, many households have private tube wells

The types of houses in this village range from mud walls with thatched roof to brick walls with tiled roofs. Many large families live in very small living quarters. As the village has a considerable problem with drainage[1], every family stores its greywater in a pit in the yard, which can eventually be filled up with soil. However, the pits storing the stagnant greywater are in close proximity to the houses, they are also often surrounded by rubbish and animal dung, hence posing a major health hazard. Although it is a subject beyond the scope of this project, it is hoped that this issue will be addressed with assistance from another NGO in the area.

The whole Terai region is economically important for Nepal, since it contains the majority of the national industries, where agriculture is meant to be the basis. In Sabaithuwa, 80% of community members are dependent on agriculture. Most households keep chickens or goats, and some have domesticated buffaloes. As these are very valuable animals, they are kept close to the housing compound. The dung is often dried and used as fuel for cooking. The close proximity of the animals, their waste and the straw from their enclosures to the households, is not conducive to a clean and safe living environment, as the animal waste and the straw clogs the drainage system, resulting in unhygienic living conditions[2].

According to the Health Post[3], pneumonia and nutritional deficiencies are the main problems for children in the village. Nutritional deficiencies such as Vitamin A deficiency are also a problem in pregnant women and anaemia in delivery cases is common. The prevalence of trachoma infection is negligible. There are some reported cases of leprosy and tuberculosis - there are 10-15 cases per day with respiratory problems for which the Health Post provides free medicine.

In Nepal, the under-five child mortality rate in 2010 was[4] **50 children per 1000**, and the trend remains downwards with a great improvement when compared to 1990 levels of 141 child deaths per thousand.

[1]Soils are saturated due to Monsoon rains, hence soakpits are used.
[2]The drainage system consists of hand dug channels along the unpaved streets. No one is responsible for keeping these channels clean.
[3] In Nepal, Health Posts are local health units, present in each Village Development Committee. The Health Post is run by the government; daily activities are run by health assistants and medicine auxiliaries. The health post updates each year the records of the diseases reported in the VDC. However, it does not keep the records of the disease of the village/community levels.
[4] The under-five mortality rate is the probability (expressed as a rate per 1,000 live births) of a child born in a specified year dying before reaching the age of five if subject to current age-specific mortality rates (http://www.childinfo.org/mortality.html and http://www.childmortality.org/).

The reference documents for the sanitation sector in Nepal are 'The National Sanitation Policy and Guidelines for the Implementation of the Sanitation Program' from 1994 and the 'Rural Water Supply and Sanitation National Policy, Strategy' along with 'Sectoral Strategic Action Plan' in 2004.

Fig. 3: The project district in Nepal

Open questions:

- *Require a representative photo for the first page*
- *Only qualitative data regarding health status available, are there other sources available?*
- *Institutional and legal framework info?*

4 Project history

In January and February 2005 a preliminary study was conducted to determine where to do the project. Sabaithuwa village was selected[5] in 2005 by the Government Department of Water Supply and Sewerage (DWSS) for an ecological sanitation pilot project called 'Promotion of Ecological Sanitation in Parsa District' in cooperation with CODEF (Community Development Forum) and WHO. CODEF is a Nepalese NGO working on various sanitation projects registered in 1999.

First experiences in introducing Ecosan toilets in Nepal took place in 2003, when pilot projects for the construction of urine-diverting dry toilets (UDDTs) were implemented in the villages Siddhipur, Khokana and Thimi. The UDDT technology was largely accepted in those villages nevertheless, issues regarding users interface were still to be addressed. Based on that, the pilot programme in Sabaithuwa was expected to overcome the problems found in the implementation of dry Ecosan in the previous piloting programme.
Since the Sabaithuwa community is quite dependent on agriculture, reuse of human waste as fertiliser was considered as potentially beneficial for the community. The implementation of latrines in itself was an innovation for the village, which was further enhanced by the concept of reuse of human waste in agriculture.

In March and April 2005 the next project step started. The NGO Jyoti Youth club was selected as the local partner for

[5] Out of the 5 villages considered in the area, Sabaithuwa was the only one in which the villagers expressed willingness to try urine use on their fields.

community mobilisation and project implementation. DWSS had worked previously with Jyoti Club and they proved reliable. In addition, this group was quite prominent in the community. It was important to have a local group working on this project in order to continue work even when there was political unrest in the area. Training for masons also took place within this time period.

The households that initially received a urine diversion (UD) latrine were selected based on recommendations of the local Jyoti Youth Club. The minimum criteria for selection of households for this project were as follows:

- possession of agricultural land,
- acceptance to handle decomposed manure; and
- willingness to apply human manure on agricultural fields.

As a consequence, the first Ecosan adopters, who received toilets for their private use, were comparatively rich people in the community, as they already owned land. Since those first toilets were 100% subsidised, the applicability of the model with lower subsidies and for poorer households will have to be proven. The subsidy and the possibility to use urine as fertiliser were the main motivation to built Ecosan toilets.

The construction of the first 20 toilets took place from May to December 2005. Agricultural experiments were done. Also other Ecosan projects were visited. Those results were shared with and within the community. The positive experience with the reuse of urine has shown multiplying effects. But the large reduction of subsidies for the next phase (see Section 9) – compared to the pilot stage of the project – has hindered the spread of the technology.

Furthermore the political disturbances from 1996 to 2006 caused by Maoist insurgency in this particular region of Nepal made regular interaction with the project beneficiaries difficult. Still, public participation and the involvement of the local youth club in the project led it to a successful result. Further promotion is still ongoing with the effort of the local youth club even after the official end of project period. This is a good sign that the project may be sustainable.

Open questions:

- *More dates need to be included in this section.*
- *How was the applicability of the toilets of the second phase proven?*

5 Technologies applied

A pour-flush urine-diversion toilet was designed particularly for Terai, in which urine is collected separately and the human faeces are simply disposed alternatively in twin pits lined with concrete rings. The technology chosen was deemed to be a low-cost option, since the adoption of dehydration technology would require elevated chambers due to the high ground water table, which in turn implied in higher construction costs. Furthermore, based on previous experiences in Nepal, the wet technology was deemed to be of simpler use considering anal cleansing habits and convenience to clean, The basic design of an Indian Sulabh[6] pour flush latrine with two external pits was used, and modified for urine diversion (see Section 6 for design details) by the local community themselves.

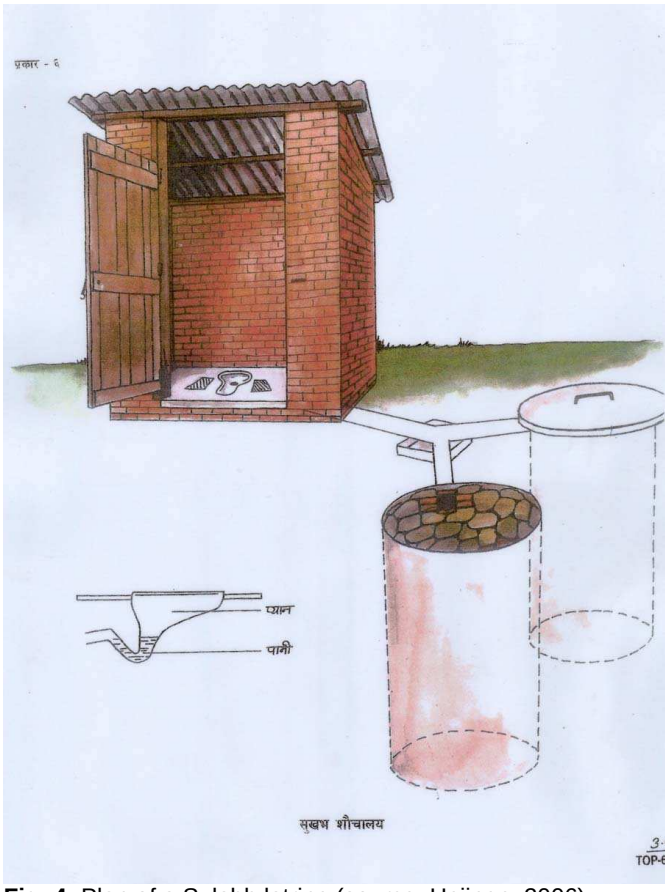

Fig. 4: Plan of a Sulabh latrine (source: Heijnen, 2006)

After the local masons received on-site training on building pans, superstructures and concrete rings from the technicians of CODEF, one of the trained masons made a few pans and performed user testing of them in his village. The pans were experimented with by men and women in the community for few days. Then the pans were modified to ease anal cleansing and stop splashes from the urine. The mason kept modifying the pan until the users were fully satisfied.

The pits were constructed underground – offset from the toilet superstructure – and have an open base to allow infiltration of liquid into the soil (Fig. 4). Urine is collected separately in a 20 or 30 L jerrican for reuse, while the faeces and anal cleansing water are flushed to the pit. About 0.5 L of water is used for anal cleansing. The pit latrines operate as pour flush latrines with 1.5 L of water used for the flushing. The pan was provisioned with a water seal which helped minimise foul smell from the vault.

According to the size of thepits, they were expected to be used for two years, after which the first pit is left inoperative for an additional two years, while the second pit is being used. After four years, the first pit is emptied via the access manhole (see Section 7).

Because urine is diverted there is no chance of nitrate leaching into the soil. But it has to be stated that there is still a potential for soil contamination, therefore the latrines are constructed more than 20 meters away from a water source. The storage of faeces is similar to that of a twin pit latrine, but it is clearly an improvement in comparison to open defecation. The latrine is slightly elevated to avoid water logging due to the high water table in this village. Anyway, technology should

[6] Website: www.sulabhinternational.org

always be carefully chosen where there is a high water table, and the use of pit latrines in this case does raise the concerns of possible water pollution. Research has also shown that E-coli cannot penetrate more than 1.5 m redial distance in medium fine sand soil (Cadwell, 1938 a) which is typical soil type in Teri region. This fact can help to resolve the general misconception that latrine pits might cause bacteriological pollution to the ground water.

Fig. 5: Double-pit urine-diversion latrines in Sabaithuwa (source: Heijnen, 2006). The black arrows point to two pits which are offset from the toilet house.

Open questions:

- *How were future users involved in the process?*
- *Examples if applicable of implemented infrastructure (collection, treatment facilities)*
- *More info on application requirements*
- *More recent source on E-coli, or is Cadwell still a regularly cited source?*

6 Design information

Two PVC pipes (of diameter 110 mm) connect the faeces hole of the urine-diversion squatting pan with the two pits, which are at a slight angle to allow easy flushing of the faeces with the anal cleansing water. Urine is collected separately in a jerrican, which is placed at the back of the latrine and is connected by a plastic tube/pipe.

urine-diversion squatting pans for this project were locally produced from cement. The design of the pan was guided by the need to ensure that the urine is well separated from faeces and that the pan is user-friendly for both men and women. The design was finalised after several community members tested the pan. It was a precondition for the acceptance of this type of latrine that it allows anal cleansing with water (the anal cleansing water is not collected separately - as would be the case in urine-diversion dehydration (UDD) toilets - but together with the faeces). The other one third of the squatting pans were made of fibre glass.

The size of the pits was calculated based on the needs of a family with six members over a two-years period. The concrete rings constructed by the local masons after training sessions had 40 cm height and 100 cm diameter.

In the first phase of the pilot project, the latrines and super-structure were fully subsidised, and therefore all have a brick and mortar super-structure and metal doors. However, a simpler design of the superstructure with locally available materials such as bamboo and mud bricks would reduce the price significantly and would have no negative impact on the functionality. This was also the plan at the beginning, but since bamboo could not be harvested during the construction period, it was necessary to use a four times more expensive brick masonry.

Fig. 6: Urine diversion squatting pan in Sabaithuwa village. Anal washwater is collected together with faeces (source: Heijnen, 2006)

Open questions:

- *Any further design information that has been used in planning for the project*
- *More on basic design parameters*
- *Info on assumptions that were made*
- *Info on applied design and construction methods*

7 Type and level of reuse

Although the initial vision of the pilot project included safe reuse of dried faeces, the main focus of this project has been the reuse of urine. Urine is collected, stored in 20 or 30-L jerricans, diluted with water and then used without further treatmentfor all types of vegetables. Most of the production is consumed by themselves and also, but not always sold on a market. The exact storage time for each household is not known.

In order to design the doses of urine for various vegetable and fruits, purposive five samples of urines from male and female representing various castes and economic status were collected and tested for obtaining value of nitrogen, potassium and phosphorous (N, P, K). Similarly, five purposive samples of soils were also collected and tested for their N, P, K values. The total Nitrogen (N) varied from 744 to 6776 mg, Phosphorous (P) from 216 to 1603 mg and Potassium (K) from 257 to 1171 mg per liter of urine. The variation might be due to the difference in the levels of quality & quality of food and liquid consumptions of people. Similarly total Nitrogen (N) value varied from 1176 to 1386 mg, Phosphorous (P) from 535 to 1074 mg and Potassium (K) from 7.33 to 87.33 mg per

kg of soil. However, while calculating the urine dose, mean N, P, K values of urine and soils of all the samples were taken .

Based on the lavatory analysis of the urine and soil samples, the dose of urine was calculated at about 32 liter in each plot of 4 m² for potato. The dose was applied in four splits at the interval of ten days, with about 8 liters of urine at each split. It was suggested to use the mixture in a dilution ratio of urine and water as 1:3. For the purpose of comparison, three plots, each of 4 m² were developed as demonstration plots; one plot without any fertilizer, the second plot with chemical fertilizer and the third plot with urine application. The on-going monitoring has shown that the growth of potato in the plot where urine was applied is better. After the potato crops are harvested, the yield (weight) and taste of the potato grown in each plot will be assessed. Farmers have been oriented on precautions to be taken on the dosages and timing while applying urine.
The farmers dilute the urine with water, on a trial basis to evaluate the best growth for each crop. The exact dilution ratios are not known, though it is recognised that this would be of interest to investigate further. An agronomist from CODEF analysed several urine samples and calculated the urea-equivalent for their application on a variety of vegetables as sample figures for fertilising.

The laboratory tests showed that the NPK (nitrogen, phosphorus and potassium) values vary considerably per stored urine sample. This can have many reasons including the variation in personal diet and water intake, but also evaporation from the urine storage container. The trend of a decrease of the NPK values over time requires that the urine should be stored with minimum air leakage from the container or should be used as soon as possible.

A total of 15 test plots were developed[7] for demonstration of urine reuse for varieties of crops by five households. Results show the enhanced production of crop after urine application. The plot with potatoes, for example, showed impressive results. The application of urine yielded 2 kg of potatoes whereas the application of chemical fertiliser and virgin soil without any treatment yielded respectively 1.5 kg and 1 kg of potatoes. This higher yield leads to a higher income for the farmers, which in turn improves the economical situation in the village. Further experiments were done, for example, on cauliflower and tomatoes.

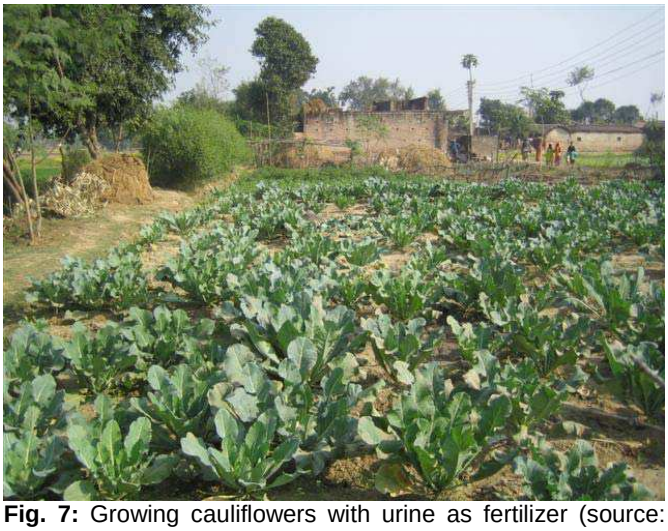

Fig. 7: Growing cauliflowers with urine as fertilizer (source: Heijnen, 2006)

A visit in late 2006 has shown that farmers who grow vegetable fruits could give up using chemical fertilisers and were only using urine. However farmers who grow grains could not completely switch to urine as only fertiliser. An application frequency of 15 days is used by the farmers.
Within the project the farmers were able to make exposures to to Siddhipurand Khokaka who already had Ecosan toilets. This exposure could convince them to apply urine as fertilizer and also as a pesticide and as a catalyst to make compost of household wastes, practices adopted by farmers in these villages.

There is no formal organisational scheme for the reuse of urine. All adaptors of the urine diversion latrines use their own urine on their own land for fertilisation (therefore prolonged urine storage times for additional safety are not required, according to WHO 2006 Reuse Guidelines[8]).

Already, farmers from nearby areas have shown interest in urine reuse after having seen positive results on the crops in some of the plots of land where different fertilisers were used.

The stored faeces from the pits are supposed to be reused as soil conditioner, but it is not known, whether they are reused actually. Personal hygiene and handwashing are important practices when applying matured faeces from the first pit in the field.

[7] Crop trials were designed by CODEF (the implementing partner) and done by the local farmers.

[8] See: http://www.who.int/water_sanitation_health/wastewater/gsuww/en/index.html

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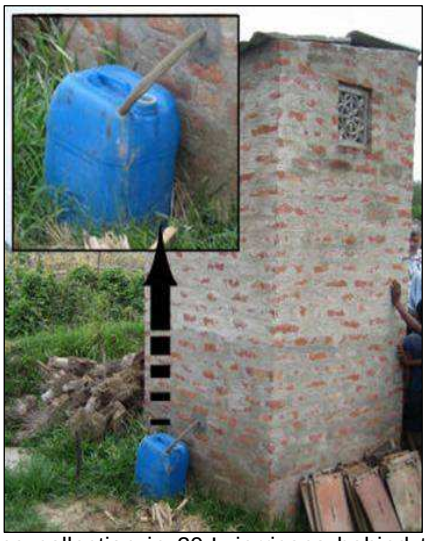

Fig. 8: Urine collection in 20-L jerricans behind the toilet in Sabaithuwa village (source: Heijnen, 2006)

Open questions:

- *Who guided the villagers for the emptying process?*
- *Were the faeces also reused?*
- *Info on application of sanitation-based fertiliser*
- *Info on area under cultivation*
- *Can urine be used as a pesticide?*

8 Further project components

The local Jyoti Youth Club continues to work to turn Sabaithuwa village stepwise into an 'ecological' village, where all human waste is reused. To make this happen, awareness and understanding of hygiene and ecological aspects need to be increased. The community members who own land have a direct incentive for the use of a UD latrine and so are to be encouraged. However it is not yet clear how the issues of hygiene and safe reuse with practical benefits will be resolved in future. This is especially relevant for poor households without land that have an interest to improve their household sanitation. These families are not necessarily interested in using ecosan urine-diversion toilets. Anyway, selling the urine to 3rd parties could be problematic since then a compliance of the WHO guideline would become necessary.

CODEF (Community Development Forum) had discussions with the women and *dalit* (untouchable) groups about their needs. It is clear that sanitation is a crucial issue for the development of the village. Women will be the major beneficiary of this program and can play a crucial role in this field. Training and empowerment of women in this regard will not only improve the overall health in the village in the short term, but it will also support the long term development of the whole community.

Already 10 new pit latrines have been provided using local resources and a simple creditscheme , and more are in the process of construction. During a follow-up visit in December 2008 by a CODEF sociologist and a headmaster of a nearby district who had introduced ecological sanitation in his community as part of a school-led total sanitation campaign, the Jyoti Youth Club expressed commitment to work on sanitation and other community development concerns, and also promote the Ecosan technology in nearby communities.

Since 2007, DWSS has joined forces with a Kathmandu-based manufacturer to produce fibre-glass "ecosan urine-diversion pans". This has allowed the expansion of ecosan applications to other, more remote rural areas of Nepal, where transport of construction materials would have been a problem.

Door to door visit
The club members made door to door visits to promote Ecosan latrines particularly to aware on importance and use of the latrines, nutrition value of human faeces and urine, agriculture use, operation and maintenance of the latrines, etc. During the visit, they were also discussed with latrine options, types of superstructures, unit cost for each type and their willingness to pay.

Mason's training
There was obviously a challenge before the project to introduce an affordable and culturally acceptable Ecosan technology in the community. Engineers and technicians of CODEF were first oriented at Kathmandu on the construction of the Ecosan pan and then were mobilized to work for the community. Then they provided training to the local masons to build Ecosan pan, concrete rings and superstructures.
An exposure visit by the farmers of the project site was arranged to Siddhipur and Khokaka to share their experiences on latrine use, maintenance, agricultural application of urine and faeces. After the visit, they were highly convinced about the value of applying urine on vegetables, fruits and wheat, etc. They were also convinced of the valuable use of urine as a pesticide and also to use it as a catalyst to make compost from household wastes. The farmers were also excited as they observed the process of borrowing and lending urine as an economic commodity.

Dissemination workshop
At the end of the project, a dissemination workshop was organized in the project site to disseminate the learning, success stories, technology, acceptability and agricultural use of the Ecosan project. The participants were farmers from the neighboring districts; Bara and Rautahat including Sabaithuwa villagers. After the workshop, the participants made commitment to the fact that they would also build latrines, provided Ecosan pan and concrete rings worth of about US $ 42 were made available to them free of cost.

Open questions:

- *Any more info on further components of the project (in addition to sustainable sanitation components described above),*
- *e.g. solid waste management, additional research on social and economic issues, up-scaling activities, etc.}*

9 Costs and economics

Construction of the substructure including two storage pits, slab, urine-diversion pan and all connections cost approximately NPR 6,000 (€ 65). For the superstructure, the use of local materials is recommended. The complete construction of the substructure and a brick and mortar superstructure cost about **€ 110**. This is relatively cheap compared to other urine-diversion dehydration toilets elsewhere (see for example other SuSanA case studies in the Philippines).

So far, € 11,200 was budgeted for the pilot phase in 2005 and € 14,700 for the expansion in 2006-2007, divided into two phases. The money is provided by WHO and DWSS.

The initial pilot project for UD latrines allowed a large subsidy for the 20 latrines, which was nearly equivalent to 100% of the cost. After this pilot study, scaling up was challenging, as the subsidy for new toilets was reduced to NPR 1,000 (€ 11) per latrine (only 10% of the total cost). Due to the financial limitations, only 52 toilets were constructed up till the end of the project in February 2009.

On the other hand, it is estimated that the savings for farmers by using exclusively urine fertiliser are approximately € 11- 13 for each set of crops, with two or three sets of crops being grown per year. This implies that an amortization of the substructure can be achieved just by saving chemical fertiliser (even without increase of harvest) approximately within 2-3 years. The cost for the superstructure can vary a lot depending on the material used. This argument can be used for awareness campaigns and advocacy in the future.

Open questions:

- *Are the 110 @ per superstructure already including labour?*
- *Ideally: a cost break-down table for the capital cost and for the operational costs.*
- *Details on operation and maintenance costs.*
- *Can farmers really save that amount of money from using urine as a fertiliser in this region of Nepal?*

10 Operation and maintenance

The owners are responsible for the maintenance or repair works. Due to the use of cement in the early pans, cleaning was found to be difficult. Early models of the fibreglass pans were also used in Sabaithuwa in the second phase of the project. Some pans had problems due to cracking of footrests. Alternative designs are currently under development in DWSS.

The pipe which is used for urine collection needs to be cleaned and checked on a regular basis due to incrustations and blocking in the pipes. As reported by the users, after use of one/two years of use of the toilets, they are still clean and pits and connections need little maintenance. However, the pit filling rate is important in order to assess when one should switch to the next pit.

The emptying of the jerricans used for urine storage is done on the basis of usage or need in the fields. The jerricans are cheap and locally available.

The Youth Club was trained by CODEF. General maintenance questions of farmers are discussed with the Youth Club or at the regular farmers´ meetings. Representatives of the Decentralized Action for Children and Women (DACAW/UNICEF) project in the nearby town of Birganj are also available for maintenance help. It is unknown whether the exact costs of maintenance have been evaluated.

Open questions:

- *Info on how the maintenance is carried out and by whom (consider also gender issues). Describe aspects regarding use of the system (how is it used?)*

11 Practical experience and lessons learnt

The enthusiastic nature of the local farmers - such as trying different fertilisers, different dilutions of urine, different frequencies of application and application on different crops - had a positive impact on the urine reuse. The farmers and their families could see the difference and realised that they could save money by reducing the use of commercial fertiliser by urine application. This was very positive for the project as everyone could observe individually and directly how things worked.

Almost all owners of a UD latrine are quite satisfied; none of the male users stated any complaints. Some of the female users complained that the ecosan urine-diversion squatting pan is difficult to clean. It is difficult to remove stains and to clean properly due to the rough surface of the squatting pan (made from local low grade cement).

This can be addressed in the future by trying to achieve a better finish (trowelling, coating). Some users also complained about ‘splash’ from the pan when urinating. Difficulties in collecting the urine was also realized in few cases due to problems with the collection hose - whether this was due to handling or bad maintenance is unclear. To which extent the latrines are used by children is also unclear.

A lack of handwashing stations near the UD latrines was noticed and also needs to be addressed in the near future. Presently, children know more about the importance of handwashing with soap than adults since they are informed at school. Hence, general awareness needs to be raised and simple and sustainable handwashing solutions must be applied to increase the health benefits of sanitation. This should be addressed in combination with overall improvements in the village, such as greywater drainage. Through the Decentralized Action for Children and Women (DACAW), an UNICEF supported programme, a variety of handwashing promotion activities were organised in Parsa District. These were started in 2006 with the training of 10 motivators for 42 VDCs, with each motivator visiting 4-5 VDC to supply information and promote handwashing practices. This project was meant to have reached the Sabaithuwa village as well, but no evidence of handwashing promotion was seen when implementing this ecological sanitation project. The awareness of community members about handwashing is basic, though some mentioned learning about the importance of handwashing with soap through their children who had been taught at the Child Development Center run by the Jyoti Youth Club.

Though the long term project aim was to increase the sanitation coverage in the village to 100%, this has proven to be too ambitious. The process is hindered by financial restrictions as well as cultural or religious reservations or a lack of information about (ecological) sanitation issues. Even if the demand is high, many people cannot afford to purchase and to construct an appropriate latrine. From the economical point of view, the pilot project experience is not representative for the chances of a large scale adaptation of ecosan due to the high subsidies for the first latrines.

It needs to be noted however that since this pilot project, ecosan has successfully been promoted in an increasing number of other communities with a subsidy of a fibreglass ecosan urine-diversion pan and connecting fittings. The cost amounts to around NPR 1000 (€ 11). Other inputs in material and labour are borne by the household, and though it takes time to complete the latrines, several hundred have been constructed in various communities.

To continue to promote sanitation sustainably, a reduction of subsidies in the second phase was necessary. But the manner in which it was done needs improvement: In phase 1 a subsidy of 100% was provided – but only richer land owners fulfilled the criteria to receive the subsidy. In phase 2, where the project was supposed to be expanded, poorer people also fulfilled the criteria but the subsidies were remarkably lowered to only 10% - this lead to a situation where the poor had to pay more for an Ecosan toilet than the richer people who had already received subsidies in phase 1. A reduction of subsidies might be necessary for a sustainable implementation. But in this case more planning and consideration should have been invested into the distribution of the subsidies between the two phases as well as the ability to pay of the users in the village.

It is heartening that the Jyoti Youth Club has continued its work. Acceptance of technology by the local population is demonstrated by the fact that 80% of ecosan households also use their toilets and the urine. Since the initial project was started many more projects have come up and ecological sanitation has successfully been promoted outside Kathmandu Valley where the "Newar community" had traditional use of an ecosan-like toilet. The government of Nepal, WHO, WaterAid, ENPHO and several other agencies are active these days in building capacities and recording experiences.

The most important fact realised in this project is that ecosan is a way forward to promote sanitation in Nepal if it is promoted through awareness with partial subsidy in terms of fibreglass urine-diversion squatting pans to the households.

Open questions:

- *Need to expand the abbreviations VDC.*
- *What happened to the toilets in the 20% of the households who did not accept the technology? What do they use their Ecosan toilets for?*
- *What coverage was achieved (i.e. the scale of impact)?*
- *What gender issues were observed?*
- *Further challenges?*
- *Further lessons learnt?*

12 Sustainability assessment and long-term impacts

A basic assessment (Table 1) was carried out to indicate in which of the five sustainability criteria for sanitation (according to the SuSanA Vision Document 1) this project has its strengths and which aspects were not emphasised (weaknesses).

Table 1 (draft): Qualitative indication of sustainability of system. A cross in the respective column shows assessment of the relative sustainability of project (+ means: strong point of project; o means: average strength for this aspect and – means: no emphasis on this aspect for this project).

	collection and transport			treatment			transport and reuse		
Sustainability criteria:	+	o	-	+	o	-	+	o	-
• health and hygiene	X				X				X
• environmental and natural resources		X			X			X	
• technology and operation		X			X				X
• finance and economics			X		X		X		
• socio-cultural and institutional	X			X				X	

Sustainability criteria for sanitation:

Health and hygiene include the risk of exposure to pathogens and hazardous substances and improvement of livelihood achieved by the application of a certain sanitation system.

Environment and natural resources involve the resources needed in the project as well as the degree of recycling and reuse practiced and the effects of these.

Technology and operation relate to the functionality and ease of constructing, operating and monitoring the entire system as well as its robustness and adaptability to existing systems.

Financial and economic issues include the capacity of households and communities to cover the costs for sanitation as well as the benefit, such as from fertiliser and the external impact on the economy.

Socio-cultural and institutional aspects refer to the socio-cultural acceptance and appropriateness of the system, perceptions, gender issues and compliance with legal and institutional frameworks.

For details on these criteria, please see www.susana.org: the SuSanA Vision document "Towards more sustainable solutions" (www.susana.org).

Long-term impacts:
The increased use of latrines is expected to have a variety of health benefits, especially in terms of a reduction in diarrhoeal disease and helminth infections.
The local Jyoti Youth club committed to scale up the Ecosan programme throughout the VDC within three years. The DDC and other district level agencies have also shown interest to replicate it in other VDCs. The farmers from Bara and Rautahat also made commitment to replicate the Ecosan concept, provided they received support in the form of pans and rings. The argument that cost of the ring and pan to build latrines is insignificant in comparison to the benefits a user can expected to gain was used by the Jyoti Youth club. It is advisable to make a provision to support poor farmers at the beginning of advocating a pilot phase, as it has worked well in the National Biogas programme in Nepal. There is a high potential of replication throughout the country if the programme is properly marketed.

Open questions:

- Are there any measures regarding the long-term impacts? (quantitative data)
- Table 1 needs to be assessed more closely.

13 Available documents and references

The following documents are available :

• DWSS (2005) CODEF Community Development Forum Promotion of Ecological Sanitation (ECOSAN) in Parsa District. Department of Water Supply and Sewerage, Kathmandu, Nepal.
• DWSS (2007) CODEF Scaling up Ecological Sanitation in Parsa District, DWSS, Kathmandu
• WaterAid (2008) ENPHO Assessment of urine-diverting EcoSan toilets in Nepal, WaterAid, Kathmandu (ENPHO is Environment and Public Health Organization) http://www.wateraid.org/documents/plugin_documents/wa_nep_ecosan_asst_rep_sept08_final.pdf
• Heijnen, M., Ranjjt, R. (2006) Developing Opportunities: Safe Water and Sanitation for All http://www.nepal.watsan.net/content/download/800/5667/file/Developing%20Opportunities_Safe%20Water%20and%20Sanitation%20for%20All.pdf

• Mishra, N. K., Shrestha, G. R (2006) A Way Forward to Promote Ecosan Programme in Nepal

• http://www.searo.who.int/linkfiles/sde_eh-557.pdf

• District map of Nepal. [cited 2006 November 2006]; Available from: http://www.mapsofworld.com/nepal/nepal-district-map.html

Open questions:

- *Further Sources still being searched for like project documents (feasibility studies, design reports, factsheets, bidding documents, operation manuals, training material, publications, maps)*
- *Links to photo sets on the project or project area.*

Important documents should be uploaded to the SuSanA library! Please send them to info@susana.org}

14 Institutions, organisations and contact persons

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Open questions:

- Contact at WHO
- Contact details of supplier of UD pans
- *Contact details of all parties involved in the project, including description of role and responsibility within the project (including e-mail addresses and websites of organisations).*

Case study of SuSanA projects

Promotion of double-pit urine-diversion toilets, Sabaithuwa, Parsa District, Nepal - draft

SuSanA 2012

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www.susana.org