



Discussion towards implementation of Ecosan for rural and urban areas in Vietnam

Nguyen Viet Anh*, Assoc. Prof. Dr.,
Center for Environmental Engineering of Towns and Industrial areas (CEETIA),
Hanoi University of Civil Engineering, Vietnam.
Address: CEETIA, DHXD, 55 Giai Phong Rd., Hanoi, 10000, Vietnam.
Tel: +84-4-869 83 17, Fax: +84-4-869 3714. Mobile Tel. +84-91320 9689.
e-mail: vietanhctn@yahoo.com, vietanhctn@gmail.com.

*Corresponding Author

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ABSTRACT

In this report, some selected projects and initiatives in promotion of advanced sanitation in Vietnam have been discussed. Three of them are introduction of Ecosan urine diverting toilets into Vietnamese communities practicing farming:

- (1) Vinasanres project in Cam Duc Commune, Cam Ranh district, Khanh Hoa province
- (2) Ecosan toilets in Y Yen district, Ha Nam province, and
- (3) in Hong Thai Commune, Phu Xuyen District, Ha Tay province.

The results show the users satisfy with those toilets, confirming number of advantages of them in compared with other sanitation types. Economic comparison shows Ecosan toilet construction cost to be much less than septic tank or other water-borne sanitation alternatives in rural areas. However, the cost for toilet construction is a main concern for poor farmers, but it is not a major selection criterion when people can afford to construct more convenient toilets. Ecosan toilets are mostly welcome in low-income farmers, and in places with water shortage. But in medium-income families and farms, especially where live-stock breeding is developed, people often prefer biogas digesters. Septic tanks and pour-flush toilets are often built in urban areas. In rural and peri-urban areas, they are built in high-income families and in places where farming is not main activity of the family members.

Ecosan concepts have been being practiced in an agriculture-based country of Vietnam for many years. However there was not enough scientific evidence to ensure all the issues of sustainable sanitation are provided including pollution control, nutrient recycle, health protection and socio-economical acceptance. Advanced sanitation has a potential future also in urban areas in Vietnam where it would bring economic values from improvement of human health, environmental protection, as well as effective and safe



nutrient and wastewater recycle. However, for effective and wide implementation of advanced sanitation in urban areas, further studies are required, and capacity building is necessary for different stakeholders, at different levels of policy and decision making.

INTRODUCTION

Ecosan concepts have been being practiced in an agriculture-based country of Vietnam for many years. However there were not enough scientific basics to ensure all the issues of sustainable sanitation are provided including pollution control, nutrient recycle, health protection and social acceptance. In last years, the new Ecosan models are already introduced in Vietnam, but studies are still very few and scattered. Some studies were on economical aspects of Ecosan, while most of others were on technical testing of urine diverting toilets, biogas digesters and close-loop farming models (VAC) in rural areas. Few case studies focused on economical comparison between Ecosan and conventional options to show the benefit for economic growth, but there were no figures stating about environmental benefits. There is no special study yet with Ecosan in urban areas. That requires further studies. Socio-economical aspects of Ecosan implementation by local users should be paid more attention. Practice shows that nowadays main reason for selection of Ecosan facility by many households is aiming at better living and working conditions (less nuisance and dirty, being released from (women's) manual handling with wastes and fuels, etc), but not for effective use of nutrients or for global environmental protection. The study was carried out under support of SENSA, SIDA in 2003 in order to figure out possibilities to bring ecosan concepts into urban areas and to scale-up the ecosan models in Vietnam. This paper presents key findings of the study.

METHODS

The study was focusing on analyses to find out opportunities and challenges for ecosan implementation in rural and urban areas in Vietnam. Field trips to selected places where ecosan toilets and other sanitation – reuse models are practiced were made, mostly in the north of Vietnam. Interviews were taken from different stakeholders. Desk work was focusing on data analyses and interpretation. Economic values were in focus of this study.

Findings from relevant (selected) projects or initiatives in promotion of advanced sanitation in Vietnam

1. SIDA Vinasanres project (updated from Calvert P. et al, 2000)

The Vinasanres toilets appear to be competitive with the alternatives available in Cam Duc. The current cost of a basic Vinasanres toilet is around 1.03 million VND and a tiled one with Chinese squat pan, or similar, around 1.32 million VND. A septic tank WC would cost around 2 million VND and a Twin Pit Pour Flush toilet around the same



as a Vinasanres toilet of similar quality. Obviously the simple pit toilets and very basic vault toilets are cheaper than this but they are not hygienic and increasingly the people of Cam Duc aspire to something better.

Besides, there is no doubt that the treated faecal matter is useful to and wanted by the farmers. They have developed their own awareness of its value and some pay for it in cash or kind. Most of the treated feces have been used on cassava fields, the principal crop of the commune. The use of urine is also quite widespread, though an awareness of its economic value appears not to have been attained. Some people add it to their manure or composting heaps, others dilute it and use it on mango trees, mix it with animal manure or urine or use it on flowers, vegetables, coconut and cashew or a mix of these. They generally say they are happy with the results.

The potential of ecological sanitation to protect public health and to save water by not flushing; to protect the environment and ground water by not contaminating them with pathogens; to improve soils and save on costs of commercial fertilizer is significant. The government and people of Vietnam could reap widespread benefits to public health and agriculture through adopting an ecological approach to sanitation. An ecological approach to sanitation can also provide considerable savings in water supply and wastewater treatment in urban and peri-urban areas. The Cam Duc demonstration should therefore be seen not simply as a small demonstration of rural sanitation appropriate for an agricultural commune but rather as the first step in a sanitation revolution which is already beginning in other countries around the world.

2. Intensive sanitation project with ecological sanitation focus in Y Yen district, Ha Nam province

An intensive sanitation project was implemented in 10 communes of Y Yen district of Nam Ha province from 1998 to 2000. The main objectives of this project were to provide knowledge on sanitation for all people including introduction of different model of hygienic latrines to households. Tree introduced latrines included ecological double vault composting latrine, pour-flush latrine and septic tank. The result of survey showed that most of people accepted all three kinds of introduced latrines and ecological one was most accepted. For instance, in Yen Binh commune, there were 81.8% of households wanted to build ecological latrine. The main reason for building this latrine is that it is easy to build, use, maintain and people can reuse of composted material for agricultural purposes. The result of this project also indicated that there was a considerable change in perception and behaviors related to sanitation, individual sanitation and other issues related to people's health. The following table shows that over 50% of interviewed households recognized changes in knowledge of environmental sanitation and disease.

39% of interviewed people recognized the improvement of sanitation condition and 35% of households saw the reduction of disease burden (particularly diarrhoea).

3. Ecosan toilets in Hong Thai Commune, Phu Xuyen District, Ha Tay Province

Hong Thai is a small riverside village located at 40 km south from Hanoi. Villagers here earn their living mainly by cultivating and breeding, reaching the medium socio-economical level for Vietnamese rural areas.

In the village a pilot project of instruction, operation and maintenance of Ecosan toilet (double-vault, ventilated, dry latrine) is run by local authority and Health Center of Phu Xuyen District, under the program of Ministry of Health (MOH). It began 1 year ago and gained some prosperous results. There are 55 toilets being constructed, 40 of those are completed and in use. Total construction of a completed ecological toilet is one million VND. One half is supported by project (including a composite pedestal), the other contributed by villagers themselves.



Picture 1. Happy ecosan toilet owner (Source: Viet Anh, 2003)

In general, recently applied sanitation facilities are acceptable and effectively improve local hygienic conditions. Ecological toilets receive positive response from user because they are free of smell and flies and because they are easy to keep clean. However, there are some disadvantages we noted from discussion with local people:

- Seating pose is not convenient (user's face is turned to the other hole)
- Volume of composted feces is too small – 30 kg for one batch, supplying only 10% fertilizer demand for one medium farm. Now it is used to put down basic fertilizer for crop. Cattle manure and big quantities of artificial fertilizer are used respectively for vegetable and rice growing. The later will spoil the soil's fertility.
- Difficult to keep toilet clean, especially with concrete/cement pedestal. Urine easily settled on channel due to roughness of the cement surface, accumulating odor trouble. Ceramic pedestal has better surface, but it breaks down easily.

Hence, the new product of composite pedestal can compensate the above mentioned limitations.

In order to force user to keep toilet clean themselves, technical assistants try to persuade them to build the toilet next to their house for convenient use. However, it somehow contradicts traditional arrangement where toilets are built in the garden corner, i.e. far away from houses. It takes time to change this inadequacy.

- For villagers, septic tank is an indicator of “social level and high hygienic standard”, so they will shift to use septic tank as soon as they have enough money.

4. Biogas reactors in Vietnam

Until now, there are about 50,000 biogas reactors installed in Vietnam, among those plastic bags, fixed cover, floating cover and other types.



Picture 2. Brick biogas construction (Source: CERWASS).

There are some reasons to the limited implementation of biogas reactors in Vietnam, as follows:

- There isn't yet any optimum technical solution of biogas reactors. Common failures of those facilities are incompatible accessories, short longevity, leakages, loss of liquid and gas, reduction of pressure in digesters chamber, low temperature, etc.
- Complexity in construction, installation and use, as well as in repair and replacement of accessories, lack of service providers, etc.
- Biogas reactors are immovable, impossible to sell when needed.
- There is still lack of unity in management of biogas technology promotion activities, technical assistance, scientific review of existing models and experience for finding out of suitable options for concrete conditions.



- Not appropriate promotion policies and investment mechanism in compared with other wastewater treatment facilities (if any).
- Inappropriate and ineffective use of liquid and solid waste from reactors.
- Difficult to construct suitable reactor in narrow square and high-densed communities.
- Construction cost is still high for medium living conditions in rural areas. Therefore biogas reactors are not implemented in poor households.
- Unstable input leads to low efficiency of reactors.
- Biogas reactors are only implemented as treatment mean in rural areas, but not studied for wider implementation in other places.

Economic benefits:

- Treatment of human and animal waste, mitigation of deforestation for seeking of fuel, reuse of nutrient sources for agriculture.
- Significant improvement of environment and ensuring safe use of fertilizer when manure is digested in biogas reactor and then composted, hence, giving the opportunities for clean agricultural products, reduction of health risks for farmers and users, reduction of losses due to illness.

Nowadays in Vietnam there is already certain experience in handling and disposing waste, but yet there are only very few cases where there exist data on which to base relevant economic analyses. However, this report tries to provide some preliminary indication of economic justification.

In recent years, a new design of biogas pit is gradually being popularized in rural areas. Constructed of bricks with a dome-shape cover to prevent gas leakage, these pits are of high quality. However, their construction costs are high. The capital cost of a pit is 2,500,000 VND, and the service time is usually above 15 years. At the higher rate of construction cost, at 6 % interest, plus 80,000 VND for annual maintenance (effluent chamber cleaning, solids and scum removal, etc.), each household can save 60,000 VND monthly if biogas is used for cooking. The figure will be more when the households implement biogas reactors in intensive livestock breeding, using biogas for cooking, lighting and warming of breeding facilities. As analyzed in Table 1 the investment cost (including interest) of a biogas pit plant can all be paid back in less than 5 years.

It is worth to note that there is a change in major purpose of biogas reactor implementation in rural and peri-urban households in Vietnam. At the beginning, the biogas reactors were used as new additional energy source because of serious lacking of electricity and fuel in the country. In recent years, its implementation is for improvement of living conditions and health, reuse of wastes, generation of new energy source and release of heavy works for women.



Table 1. Cost and benefit (in VND) of biogas pit from bricks.

Year	Cost per year, VND	Interest per year (i = 6%)	Maintenance expense, VND	Benefit per year, VND	Cost transfer to next year, VND
1	2,500,000.00	150,000.00	80,000.00	720,000.00	2,010,000.00
2	2,010,000.00	120,600.00	80,000.00	720,000.00	1,490,600.00
3	1,490,600.00	89,436.00	80,000.00	720,000.00	940,036.00
4	940,036.00	56,402.16	80,000.00	720,000.00	356,438.16
5	356,438.16	21,386.29	80,000.00	720,000.00	-262,175.55

5. Decentralized wastewater management in urban areas

The decentralized concept is based on a simple premise: Wastewater should be treated (and reused, if possible) as close to where it is generated as is practical.

Due to the terrain conditions and lakes and ponds in cities, the sewerage system is usually divided into small and independent catchments. Therefore, decentralized sewerage systems are suitable to almost all of Vietnamese cities and towns. The advantages of a decentralized approach will be most pronounced in sub-urban areas and small provincial towns where there is no centralized sanitation system yet and integration with agriculture is still an option. Using the natural conditions and self-purification of the water body, the establishment of the small and medium scale wastewater treatment plants will be convenience.

From 1998, CEETIA, in cooperation with Department of Water and Sanitation in developing countries (SANDEC), Swiss Federal Institute for Environmental Science and Technology (EAWAG) have been working on decentralized sanitation concepts and technologies for urban and peri-urban areas in Vietnamese conditions. At CEETIA's Laboratory, some models of baffled septic tanks with anaerobic filters (BASTAF) have been installed. The experimental data show that baffled septic tank with anaerobic filter could effectively treat black wastewater from toilets, with removal efficiency by COD from 43.2 to 94.9 % (average 74 %), by BOD₅ from 45.3 to 90.9 % (average 71.1%), by SS from 47.6 to 97.2 % (average 75.4%). Based on studied results, system of a settling chamber, 3-4 baffled chambers followed by 2-3 anaerobic filter chambers are suggested as low-cost and effective solutions for on-site/decentralized wastewater treatment for individual houses, group of houses or for urban residential areas. Effluent from BASTAF goes to the post-treatment facilities, centralized or decentralized. CEETIA also constructed some pilot BASTAFs for some household in Hanoi city. The monitoring data show very positive results for their wider dissemination. Some other low-cost naturally-based wastewater treatment processes are also studied at CEETIA.



Picture 3. BASTAF construction in Hanoi city. (Source: Viet Anh, 2003)

DISCUSSION AND CONCLUSIONS

Urine diverting composting toilets were implemented in Vietnamese farms for hundred years. That brought easy acceptance to Ecosan concepts introduced in last few ten years. However there is still a big gap between successful practices and large scale implementation.

There is still limited studies about urban agriculture, and only very few studies on urban Ecosan. In order to introduce Ecosan in urban areas, it is necessary to introduce urban agriculture, its importance and understanding, together with environmental protection and health care.

There is a question for feasibility of Ecosan in urban areas. We are in an agricultural based economy – we do not have to forget about rural areas, i.e. sanitation system would work sustainably if we could establish a connection/link between urban and rural areas. The problem is to determine the right scale of system and related locations. (E.g. market or output for the Ecosan products). In that case people would be convinced to go for Ecosan.

Another question is will there be people interested in getting the composted fertilizer from dry toilets of urban centers? The demand should be created somehow. In Vietnam, in order to achieve intensive cropping, many farmers prefer chemical fertilizers instead of handling human excreta. The technical assistance is very needed in cooperatives and communes so that people could understand which fertilizers should be used for a green and clean agriculture. That question also related to creation of demand for Ecosan products for a healthy agriculture.



Furthermore, there is still an unsolved question among Ecosan alternatives. While the dry sanitation, which seems “best option” from technical point of view, is not easy for implementation scaling up in most of urban centers, the upgraded from existing systems with settled sewerage, simplified sewerage, or on-site water-born treatment with improved septic tanks followed by natural wastewater treatment processes, etc. are the ones from feasible options for low-income cities, from both social and environmental points of view. In our opinion, don't say we will rehabilitate existing systems. Within available possibilities, we have to try to improve it first, with consideration towards long-term planning for sustainable development. In any case, the wastewater and nutrients reuse should be taken into account and encouraged, and, besides economical and social aspects, they might be reused safely.

For implementation of Ecosan concepts and models it is necessary to have a suitable policy from the Government. The policy maker should understand first the idea of Ecosan and what the country and region could benefit from that for sustainable development. With Vietnamese specifics, as described above, the Ministry of Construction (MOC) is responsible for development and management of water and sanitation in urban areas. At the central level, MOC should be targeted to introduce the Ecosan concepts for urban areas, and the capacity building as well as the Ecosan demonstration projects should be born with participation (or management) of the MOC. After getting new concepts and successful results from demonstration projects, the Ecosan could find the way to be disseminated in urban areas, starting from integration of Ecosan concepts in to the Government policies, regulations, standards, until the practical implementation on the sites. There is also one point to be noted that there isn't yet good cooperation and coordination among related sectors in Vietnam, including the ministries. Thus, capacity building should be not only for MOC, but also for the other ministries and sub-ministries organization, so that Ecosan could be understandable in their development course.

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