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## Sustainable toilet technologies bring dignity to women and reduce disease risks

In India, the sanitation scenario, till the late sixties was dismal. In rural areas no house had a toilet. In cities there were no community toilets and bucket toilets were cleaned by ‘human scavengers’ or ‘untouchables’. In 1970, I decided to start a silent revolution for the removal of untouchability through their liberation. I invented, innovated and developed two technologies: one for individual houses – Sulabh Shauchalaya – and the other for public places. The biogas digester connected to a public toilet recycles human excreta to biogas which can be put to various uses. The effluent discharged is treated through Sulabh Effluent Treatment technology by which it becomes colourless, odourless and pathogen-free and can be discharged into rivers/water bodies without polluting them. These on-site, sustainable technologies help to reduce global warming, economise water-use and produce bio-fertiliser. The Millennium Development Goal on sanitation can be achieved by use of these technologies.

**Keywords:** toilets, human scavengers, untouchability, on-site technologies, liberation

### Background

In 1970, I started the Sulabh Sanitation and Social Reform Movement to solve three basic problems that India was facing – defecation in the open, manual cleaning of bucket toilets by people called human scavengers and public places without toilet or urinal facilities.

Lack of safe water and facilities for the disposal of human excreta are two key factors behind the huge burden of infectious diseases

like diarrhoea, dysentery, cholera, typhoid, hepatitis and worm-infections, particularly in the developing countries.

In earlier civilizations, like the Greek, Roman and Indus, toilets, baths and other facilities were provided; but with the advent of new civilizations everybody around the world started going outside and defecating in the open. By the 20th century, Europe, America and Australia had solved the problem of sanitation through the provision of septic tanks and sewerage systems. Because these technologies were not affordable in terms of both construction and maintenance costs, and they required enormous quantities of water to work properly, the sanitation problem remained in Asia, Africa and Latin America. In these continents, 2.6 billion people do not have access to safe and hygienic toilets.

In India, the sanitation scenario, until the late 1960s, was dismal and in rural areas almost no house had a toilet. Everybody in the village used to defecate in the open. Given the lack of toilets, women suffered the most; they had to defecate before sunrise or after sunset. Sometimes they faced criminal assaults or suffered snake bites while defecating in the evenings. Girls generally did not go to school as no schools in the rural areas had toilets. In the villages, many children used to die because of diarrhoea and dehydration. My own sister’s son died of diarrhoea.

In urban areas, only few towns had sewerage system facilities. Fifteen per cent of the urban population used septic tanks. A large number used to defecate in parks, lanes and on both sides of the railway tracks. The remainder of the population used bucket toilets cleaned by human scavengers who carried human excreta as head-loads.

If scavengers had not cleaned the bucket toilets, there would have been epidemics of cholera, diarrhoea, dysentery, etc. and people



Figure 1. A woman scavenger cleaning a bucket toilet manually, a sub-human practice

would have died in large numbers. But society kept them at the lowest ladder of the social structure of the caste system and gave them the stigma of being “untouchable”. They were ostracised and had to live on the outskirts of the city/town lest they touched anyone by mistake. Women would not give them food hand to hand, but dropped it into their palms. If they were thirsty, water was poured from a safe distance into their cupped palms. Even the traders would accept their money only after cleaning the coins. There was no question of their going to school, entering temples or their children playing with children of other communities. They played amongst themselves or with pigs.

There are two types of prisons; one is the physical prison run by the government, from which a prisoner can be released after days, months or years, except for heinous crimes. However, in India, before independence, there was a social prison without walls called the caste system, where a person born an untouchable would die as an untouchable.

Another critical problem was that there were no community toilets and urinal facilities in public places near railway stations, bus stands, marketplaces and religious and tourist places. It was very difficult for the people to manage when they felt the call of nature; they had to go to a nearby pond or bush or any dirty place just to defecate. Because of this lack of public conveniences, people, especially foreigners, were discouraged from visiting India.

In the days when you could not count on a public toilet facility, an English woman was planning a trip to India. She registered to stay in a small guesthouse owned by the local schoolmaster. She was concerned as to whether the guesthouse had a WC (water closet). She wrote to the schoolmaster inquiring about the availability of a WC. The schoolmaster, not being fluent in English, asked the local priest if he knew the meaning of WC. Together they pondered possible meanings of the letters and concluded that the lady wanted to know if there was a “Wayside Chapel” near the house. A bathroom never entered their minds. So the schoolmaster wrote the following reply:

*Dear Madam,*

*I take great pleasure in informing you that the WC is located 9 miles from the house. It is located in the middle of a grove of pine trees, sur-*

*rounded by lovely grounds. It is capable of holding 229 people and is open on Sundays and Thursdays. As there are many people expected in the summer months, I suggest you arrive early. There is, however, plenty of standing room. This is an unfortunate situation especially if you are in the habit of going regularly. It may be of some interest to you that my daughter was married in the WC, since she met her husband there.*

*It was a wonderful event. There were 10 people in every seat. It was wonderful to see the expressions on their faces. My wife, sadly, has been ill and unable to go recently. It has been almost a year since she went last, which pains her greatly. You will be pleased to know that many people bring their lunch and make a day of it.*

*Others prefer to wait until the last minute and arrive just in time! I would recommend that your ladyship plan to go on a Thursday, as there is an organ accompaniment. The acoustics are excellent and even the most delicate sounds can be heard everywhere. The newest addition is a bell which rings every time a person enters. We are holding a bazaar to provide plush seats for all since many feel it is long needed. I look forward to escorting you there myself and seating you in a place where you can be seen by all.*

*With deepest regards,  
The Schoolmaster.*

*No wonder the woman never visited India!!!*

Another problem was that Indians were not used to paying for the use of toilets. The British Government passed an Act in 1878 to maintain public toilets on a “pay and use” basis, but it did not work. Toilets built by local bodies were not maintained properly, hence, were considered as a veritable hell on earth. Nobody liked to go inside the public toilets and tried to avoid even passing by those areas because of the terrible stink. Therefore, the absence of public toilets in public places was a great problem in India.

The human scavengers were treated as untouchables and they were hated, humiliated and insulted by the people for whom they used to work. In the Indian society, before the Independence of India in 1947, a person born into the “untouchable” caste died as an “untouchable”. There was no chance of any change in the caste structure.

Mahatma Gandhi was the first person whose attention was drawn towards the plight of scavengers. He wanted scavengers to be released from their sub-human occupation of manually cleaning up human excreta and wished to restore their human rights and dignity, to bring them on a par with others in society.

I wanted to be a teacher of sociology at a university, but somehow I could not become one. I did sundry jobs and finally I joined the Gandhi Birth Centenary Celebration Committee in Bihar in 1968. There I got the idea of fulfilling the dream of Mahatma Gandhi. It was difficult for me to solve the above sanitation problem which India was facing as I belonged to an orthodox Brahmin family. Once I touched an untouchable lady named Dome. My grandmother made me swallow cow dung, cow urine and Ganges water to purify myself.

I decided I would solve the problem some way or another; unlike so many others in the world who are experts in collection of information, but are unable to deal with its dangers. So to prepare myself to shed my own prejudices against untouchables, I went and lived in a colony of scavengers for three months. There I encountered two incidents.

In sociology it was taught that if one wanted to work for a community one must build a rapport with the people of that community so that one can come to know about them. It was this lesson which prompted me to live in a scavengers' colony with the help of a scavenger. I lived in the colony of scavengers for three months and came to know about their origin, culture, values, mores, etc. When I came to live in the scavengers' colony named after Mr. Jagjivan Ram, a freedom fighter and former Deputy Prime Minister of India, I was not quite sure whether to continue in the profession, as my father was very upset because Brahmins and toilets did not go together. At that time, I was also married and my father-in-law was extremely angry and berated me in a language which I am loathe to repeat. The people of the Brahmin community also ridiculed and humiliated me occasionally. The situation was totally unfavourable and nobody appreciated my initiative to change the lives of the untouchable scavengers.

One particular morning while living in Bettiah in the scavengers' colony, I noticed that a newly married girl was being forced by her in-laws' family to clean the bucket toilets and she was crying bitterly as she was most unwilling to do so. On hearing her cries, I went and intervened, trying to persuade the family members not to force her, if she was unwilling to go and clean toilets. They heard me, but did not agree, counter-questioning me about what she would do from the morrow if she did not do the work of scavenging and earn some money. Even if she sold vegetables, who would buy them from her, she being an untouchable? Finally, despite my protests, they sent her to clean the bucket toilets.

After a few days, as I was going to the market with a colleague of mine from that colony, we saw a bull attacking a boy of 10–12 years who was wearing a red shirt. When people rushed to save him, somebody from the back shouted that he belonged to the “untouchable” scavengers' colony, whereupon everybody left him. We took him to the hospital, but the boy died. After this incident, I took a vow to fulfil one of the dreams of Mahatma Gandhi – to get the scavengers released from their sub-human and health hazardous occupation of manually cleaning and carrying human excreta.

While living in the colony I studied carefully the books written by Mr. Rajendra Lal Das and the book “Excreta Disposal for Rural Areas and Small Communities” published by the World Health Organization in 1958. The following sentence from the WHO book left a deep mark in my memory:

“Suffice it to say here that out of the heterogeneous mass of latrine designs produced all over the world, the sanitary pit privy emerges as the most practical and universally applicable type.”

This book was about disposal of human waste in rural areas, but the problem of scavenging was mainly an urban one because most scavengers used to work in urban areas. Here I applied my mind and thought that if the soil conditions in rural and urban areas were the same, then there was no reason why a technology recommended for rural areas could not be applicable to urban areas. In my opinion, the application of the mind is more important than knowledge. Knowledge can be borrowed, but its application has to be your own.

Ideas have changed the world! It may be the case of the idea of James Watt who developed the concept of the steam engine, on which principle the train system was developed, or Newton's theory of gravity which he conceived when he saw an apple falling from the tree or

Alexander Fleming's theory about penicillin. Ideas play a very important role in the solution of problems.

## Purpose/aim

Being a follower of Mahatma Gandhi, I decided to start a silent revolution of non-violence and peace for the removal of “untouchability” through the liberation of human scavengers with the help of a toilet technology whereby the services of scavengers would not be required. To get them released from this occupation, I had to find out technologies which were appropriate, affordable, indigenous and culturally acceptable.

By the end of about two years, the sludge has been digested and converted to manure, a good soil conditioner. After two years or so, when the second pit is full, the first pit can be emptied of its human waste which has become manure, containing nitrogen, potassium and phosphate and which works as a bio-fertiliser to improve the yield of flowers, fruits and plants and the productivity of the field. In different geological conditions, this technology remains the same, only the building materials and period of emptying of the pits vary.

A squatting pan with a steep gradient for pour-flush and trap with a 20 mm water-seal is used in Sulabh toilets. The pan can be of ceramic, fibreglass, mosaic or cement concrete. Sulabh toilets require only between 1 and 1.5 litres to flush per use. Therefore, the Sulabh water-seal saves an enormous quantity of water. In the Sulabh system there is no chance of contamination of the drinking water supply lines, as in the case of a sewerage system, if the hand-pumps are located five metres away from the latrine pits. Open wells should be ten metres away from the same.



Photo: Sulabh International Social Service Organisation

Figure 2. Sulabh twin-pit, pour-flush, compost toilet – a simple solution to achieve the Millennium Development Goal on sanitation

The Sulabh toilets can be constructed even in areas where water table is high. The upper portion of the pits has to be kept two feet above the water table. The slab cover of the pits can be used for various household purposes like cleaning food-grain, cutting fish and vegetables, cooking or offering prayers, which is not possible in case of a septic

tank. Sulabh toilets have been designed in such a way that the poorest of the poor, the middle class and even the rich can have toilet facilities, according to their financial capacity.

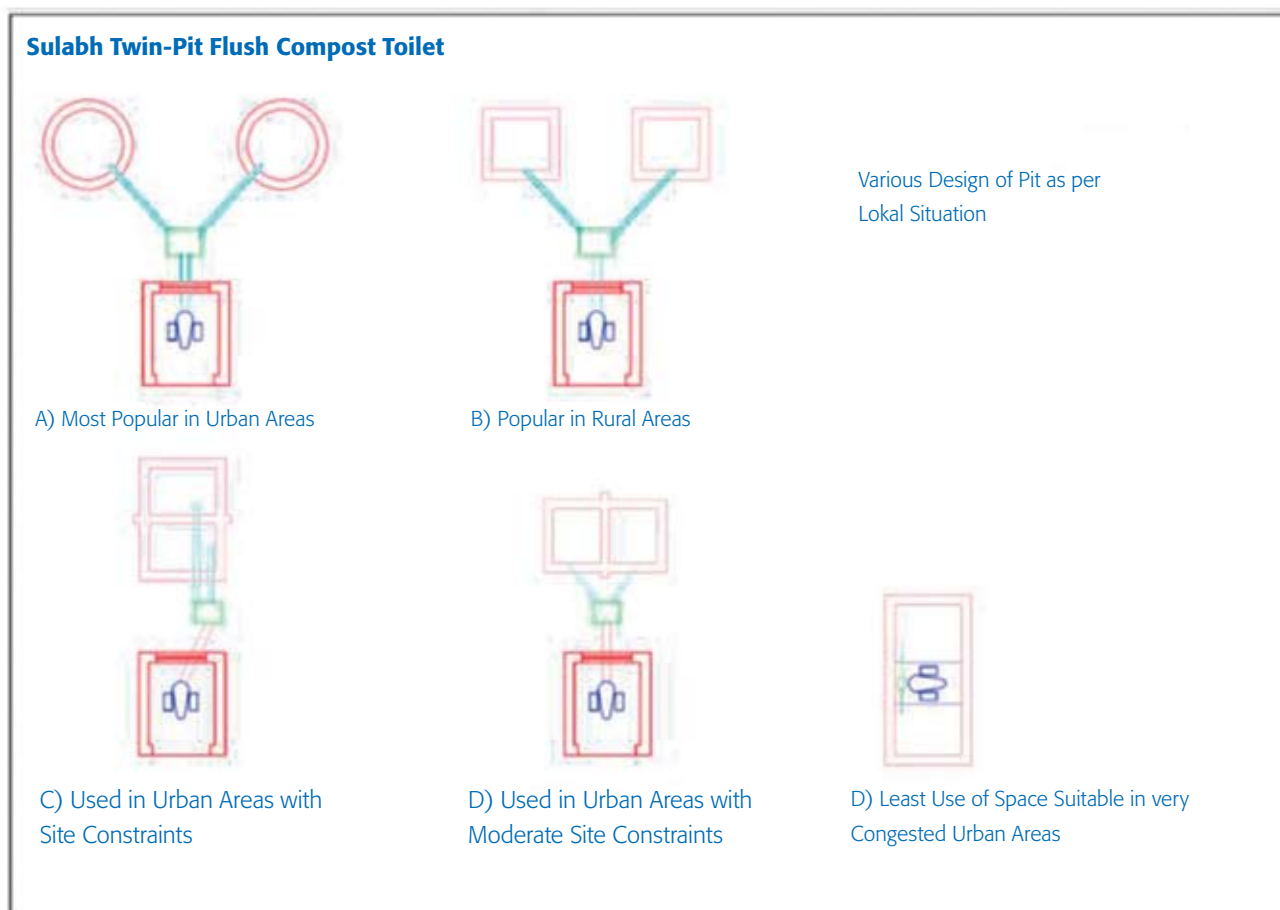
The Sulabh toilets can be constructed in a minimum space compared to other technologies of the world. The space required would be two metres in length, one metre in width, with a depth of maximum two metres. The pits may be of circular, rectangular or square in shape (Figures 3a and 3b). If space is available, the two pits of Sulabh toilets should be kept separated by a minimum distance of one metre. Because of this, at the time of cleaning the pit, no water is found at the bottom of the pit.

If there is less space, then two pits can be constructed side by side with a dividing wall of minimum 5 inches (Figure 3d). If there is a space constraint, the dividing wall may be of 10 inches and the upper portion may be of 15 inches. The pan on it can be attached to two drains (Figure 3e). Both the pits are covered with slabs. In narrow lanes, two pits can be made side by side, connected with pipes for discharge of human excreta into the pits (Figure 3c). In this way, Sulabh toilets can be constructed even in the smallest space. They can be constructed even at the door-step of a house or on the upper floor of a house. Locally available materials such as bricks, stones, logs and burnt clay rings, etc. are used for lining of the pits.

When the temperature fell to  $-14^{\circ}\text{C}$  in 1984 in Srinagar, the capital of Jammu and Kashmir, India, this technology worked very well, as the gases from the pits prevented the water in the water-trap from freezing, unlike the septic tank and sewerage system in which it did freeze.

We have installed more than 1.2 million individual household toilets and the Government of India has installed more than 54 million toilets based on the same technology. Thus, we have been able to improve the living conditions of the people, upgrade the environment, reduce diseases and also reduce poverty so that there are more man days for economic productivity. Because of this technology, women can now go to the toilet with dignity and in safety and girls go to school as they now have toilets. The infant mortality rate (IMR) for children under five has been reduced from 129 per 1000 live births in the 1970s to 57 per 1000 live births in 2006. Millions of “untouchable” scavengers have been released from this sub-human occupation and their human rights and dignity have been restored. The UNDP, in its Human Development Report 2003, has recommended the use of this technology by international agencies and developing countries.

In public toilets, pit latrines and septic tanks frequently get filled up; therefore, I innovated, invented and developed a technology to



Figures 3 a- e. Various designs of pits as per local situation

recycle human waste. From a public toilet human excreta flows by gravity into an attached biogas digester. Before commissioning the digester, 30 to 40 kg of cow dung is initially put inside. After 30 days, biogas is produced. The biogas is channelled for lighting mantle lamps, warming oneself during the winter, cooking and also for conversion to energy for street lighting. The people in the vicinity also get the biogas which they use for cooking or lighting.

Five public toilets linked to biogas plants have been erected in Kabul, Afghanistan. All are functioning very well, even when the temperature in Kabul went down to  $-30^{\circ}\text{C}$  in 2007; so this technology is suitable even for cold climates.

This technology can be used in housing estates, high-rise buildings, schools, colleges, hospitals, etc. In a septic tank, human excrement is of no use. Using Sulabh technology, methane, which comprises 65% of all the gases produced in such tanks, burns and is used for different purposes. It is not allowed to escape into the atmosphere. So this technology also helps to reduce global warming and mitigates climate change.

Earlier there was a social stigma and psychological taboo against handling human excreta. This arose because only people of the lowest economic strata were supposed to be associated with this work. Since human excrement was considered as the most hated object in society, it was difficult for any one to consider that a project related to its disposal could be financially viable. However, Sulabh made it



Photo: Sulabh International Social Service Organisation

Figure 4. Front and side view of Sulabh Toilet Complex at Kothi compound, Rewa

financially viable under an arrangement whereby the cost of construction is met by the local body and the maintenance of the toilet blocks and the day-to-day expenses are met from the user fee. Sulabh does not depend on external agencies for finances and meets all its financial obligations through internal resources. Not all the toilet complexes are self-sustaining, particularly those located in slums and less devel-



Photo: Sulabh International Social Service Organisation

Figure 5. Human excreta based biogas is used for warming oneself, cooking, lighting mantle lamps and power-generation.



Photo: Sulabh International Social Service Organisation

Figure 6. Sulabh Effluent Treatment (SET) technology

oped areas. The maintenance of such toilet complexes is subsidised from the surplus income generated from toilet complexes in busy and developed areas.

Technology is important, but also important is how to deliver it to people. Simply developing the technology does not suffice. So, I developed a system of delivery of service to the beneficiaries at their door-steps. In Sulabh, ethics, morality and integrity are maintained in the delivery system. Sulabh workers go house to house, motivate and educate the beneficiaries and they have the onerous responsibility of going to local bodies to request grants on behalf of the beneficiaries to build toilets in their houses. We give them a guarantee that we will rectify any defects that develop within five years and, in that way, Sulabh has been able to gain the confidence of the people as well as the government and has gained credibility with them.

In India, there is a problem with maintenance and follow-up on work after its completion. Since we developed a system of maintenance and follow-up, the system worked successfully. While doing all these things, I had to take many unconventional decisions to relieve the scavengers and to bring them into the mainstream of society.

Two or three significant changes in this area have taken place in India. Previously, the subject of toilets was a taboo in Indian culture. Nobody talked about it while having meals, but now they talk about Sulabh while having lunch or dinner. We have been able to change

the thoughts, attitudes and behaviour of the Indian people towards toilets and “untouchable” human scavengers. Secondly, the concept of “untouchability” is no longer attached to the profession of the construction and maintenance of toilets. Thirdly, in India, there are frequent communal clashes between Hindus and Muslims, but in the public toilets we have not found any tension so far amongst the users, irrespective of their religion and caste. Anybody can come and use the toilet and nobody discriminates against anyone else.

With the implementation of Sulabh on-site technologies, scavengers are liberated from their dehumanising work. They were the most oppressed and suppressed class of Indian society – humiliated and ostracised. I started vocational training programmes for them to help them develop their skills in various market-oriented trades, such as tailoring, embroidery, typing, short-hand, electrical jobs, audio-visual assembly and repair, beautician’s courses, etc., to change the course of their lives. There is a sea change in the attitude and thinking of society, and now the scavengers intermingle with others in the mainstream of the society.

As education holds the key for any progress, especially for the downtrodden and oppressed, I started the Sulabh Public School, an English medium institution, in New Delhi in 1992 to prepare children from the weaker sections of society for a better life. Sixty per cent of the children attending the school come from scavenger families and

40% from other classes, so that they can inter-mingle with each other from childhood. The children share their “tiffins” with each other, which helps to break the social barriers. In Sulabh School Sanitation Clubs, teachers and students are both taught how to keep the toilets clean, which they do by taking turns.

In March 2003, a centre called Nai Disha (New Direction) was started at Alwar in the state of Rajasthan, for women who were engaged in the work of scavenging to rehabilitate them through vocational training. They were taught personal hygiene, basic literacy knowledge and were trained to make eatables, like papads, noodles, pickles, etc. The training programme is followed by rehabilitation so that they get sufficient time for their economic empowerment. The social transformation brought about can be gauged by the incredible fact that the same society that was averse to touching a scavenger, today readily purchases products (even eatables) prepared by the hands of these very scavengers. They were given a stipend through banks and taught to maintain a bank account, which has also helped them to acquire self-confidence.

During the World Toilet Summit 2007, organised by Sulabh in New Delhi, the erstwhile scavengers walked the ramp with the top models of India, who displayed their handiwork. HRH the Prince of Orange of the Netherlands applauded their work, congratulated them and presented them with flowers.

For social interactions, I took the “untouchable” scavengers to the best restaurants. People laughed at me because they were unable to conceive, much less appreciate, this idea, but I wanted to show them that they could also come to these places. They were not meant only for the “elite” class of people. I took them to visit the Honourable Prime Minister of India, who gave them an audience. The Department of Economic and Social Affairs of the United Nations invited them to participate in the UN and to make a presentation on the theme of “Sanitation for Sustainable Development”. Two erstwhile scavengers spoke from the podium. The women participated in a fashion show “Mission Sanitation”; they walked the ramp along with eminent Indian and American models who showcased their skills. Finally, they went to the Statue of Liberty to declare themselves free from the bondage and shackles of slavery and to tell the world that they were untouchables no more.

On their return from New York, the Honourable President of India gave them an audience and blessed them. The upper caste people who shied away even from the shadows of the “untouchable” scavengers, now sit with them and have food with them.

For doing all these things, the application of the mind is more important than knowledge. Knowledge can be borrowed, but one has to apply one’s own mind to solve problems. You should have a killer’s instinct, like in love and war, to solve a problem. Concentration of the mind is very important, just as a good dancer, flautist, poet and writer concentrate. In an Indian epic, “Mahabharat”, the hero of the war, Arjuna, aims and pierces the eye of the rotating fish. When asked how he did it, he said he only saw the eye of the fish and nothing else. While the famous poet Samuel Taylor Coleridge was writing “Kublai Khan”, somebody knocked at his door, his concentration was broken and he could not continue and complete his poem. The half-written poem is still taught in English literature.

Recently a Brahmin invited a scavenger to the marriage of his daughter, accepted a gift from her and gave her food along with her family members. This was unheard of in the social history of India, but has now happened. Now the pages of history have been turned and the scavengers have been accepted by society.

To arouse the interest of people in sanitation, I established the Sulabh International Museum of Toilets in 1992 in New Delhi. I was inspired to do so during my visit to Madam Tussaud’s Museum in London. The Museum of Toilets has displayed the chronological development of sanitation over the last five thousand years. It has a unique display of Su-jok therapy by Dr. Sir Park of Korea, which shows that the call of nature can be controlled, or vice versa, by acupressure on the palm. People from more than 100 countries have visited Sulabh Centre for Sanitation and Social Change.

Eighty per cent of the diseases in the world are due to unsanitary conditions. To achieve integrated health care, I established the Sulabh International Institute of Health and Hygiene in 1994. Health centres have been set up in public toilets for preventive, curative and rehabilitative medical care of the poor and needy. Eleven thousand women in the urban slums of various states have been trained in good hygiene practices and manuals have been prepared for the same. Women volunteers have been trained to serve safe drinking water to urban slum dwellers.

Additionally, an Academy on Environmental Sanitation and Public Health was set up for planning, monitoring and implementing of projects relating to Environmental Sanitation. The focus of the Academy is on water, sanitation, health and hygiene, capacity building and training at national and international levels and for carrying out applied and fundamental research as well as consultancy in the area of environmental sanitation.

The Sulabh Encyclopaedia on Sanitation, a reference work, has given a new dimension to public health. It is a unique academic exercise, which was spread over a decade and compiled by a team of dedicated technical professionals with expertise in the area of sanitation.

Further, to make the sanitation sector more lucrative, technical and professional I have initiated the setting up of a University of Sanitation. It was realised that sanitation is a technical as well as a social problem. To overcome the problem in a heterogeneous society with respect to socio-economic and cultural aspects is more challenging. The magnitude of the problem also varies widely in different regions of the world. The University of Sanitation will help a lot to overcome the problem in different regions/societies. Thus, our vision and mission go hand in hand with the Millennium Development Goals.

Sulabh has Special Consultative Status with the Economic and Social Council (ECOSOC) of the United Nations. Sulabh’s sanitation programmes have been acclaimed as outstanding innovations for improving the environment, ecology and community health, both in rural and urban areas. His Holiness, Pope John Paul II, gave me an audience in 1992 before the International St. Francis Prize for the Environment (Canticle of All Creatures) was bestowed upon me.

## Conclusion and recommendations

I, together with the Sulabh technologies, their application, vision, implementation, commitment, capabilities and efficiencies, have been able to provide dignity to women – to use a toilet with privacy and safety. We have released millions of scavengers from their sub-human occupation and brought them into mainstream society by giving them education, training and empowering them on a par with others.

The technologies developed by me are suitable not only for developing countries, but also for developed ones. In household toilets of the Sulabh design, the gases produced are absorbed by the soil and they are not allowed to escape into the atmosphere. In the biogas digester, of the gases produced – methane, carbon dioxide, nitrogen, hydrogen sulphide and others – methane is easily combustible and can be burned for different uses. In this technology human excrement is recycled on-site and hence is one of the best examples of sustainable development.

The Sulabh technologies first help to reduce global warming because they help to reduce pollution of the atmosphere. Second, in both the technologies, enormous quantities of water are saved, helping “access to water for the common good”. Third, in the technologies, bio-fertiliser is produced. Both technologies fulfil all the conditions of a sanitary latrine. Therefore, these technologies are universally applicable.

In brief, it can be said that the Millennium Development Goal on sanitation can be achieved by use of these technologies. Adopted with some modifications according to local conditions, and in a decentral-

ised manner, we can solve the problem of low sanitation coverage. The Millennium Development Goal on sanitation cannot be achieved if we think in terms of sewerage and septic tank systems only.

My story can be compared with that of the seagull in the fable “Jonathan Livingston Seagull” by Richard Bach. The seagull was discouraged from flying high in the sky by his parents as his job was to fly from the shore to where the fishermen used to cut fish. He was insulted, humiliated and faced difficulties while flying high, but he finally succeeded. After he became successful, he trained other seagulls to fly high also. My story is the same. Because I belong to a Brahmin family, my father was sad and my father-in-law angry when I took up this job. In the same way as the seagull, I faced many difficulties and succeeded. We are training people in Sulabh technologies, which are patent-free, and empowering them. Already the national Government of India has replicated Sulabh Technologies in millions of rural and urban households under the total sanitation campaign. We have constructed public toilets in Bhutan and Afghanistan. We have trained professionals from 14 African countries so that they can install these technologies with some modifications in their respective countries. I suggest that the entire world, particularly the developing countries of Asia and Africa, should adopt the technologies mentioned above to solve the problem of sanitation to achieve the Millennium Development Goals.

Martin Luther King Jr. once said that even if a person’s job was to sweep the road, he should sweep the road so well that all the angels in heaven should stop and say, “Here lives a wonderful sweeper!” I have tried to emulate the same in my life. ■