

ABSTRACTS



National Conference on

Cost Effective Sustainable Sanitation

An Indian Experience

28th - 30th June 2010

India Habitat Centre, New Delhi, India

Organized By



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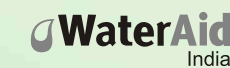
India Habitat Centre, New Delhi, India

Organized By



Water, Sanitation and Hygiene (WASH) Institute
Kodaikanal, Tamil Nadu

Supported By



Background

The Conference on Cost Effective Sustainable Sanitation - An Indian Experience

The constant efforts from the State and Central Governments with an active support and involvement of civil society organisations, national and international NGOs, UN organisations are now showing positive results in the sanitation sector in India. The sanitation coverage is demonstrating progressive trend continuously. However, the speed at which the sanitation progress is happening vs huge un-served population in the country, alarming rate of villages slipping back to open defecation, (ODF) ever increasing population and bulging of urban slums due to continues migration are some of the key challenges in achieving sustainable results in sanitation sector in the country. Various studies conducted in the recent past indicates that if these challenges are not addressed timely, there is a possibility of missing out sanitation Millennium Development Goal target with most of the un-served populations in rural Africa and Asia.

During 2008, SACOSAN III was well organized by Department of Drinking Water Supply, Government of India, and now, there is a greater need to revisit some of the commitment made in SACOSAN III and accelerate the sector players' progress towards achieving Millennium Development Goals on sanitation.

Purpose

WATER, Sanitation and Hygiene (WASH) Institute is organising this conference with the aim to bring together all the key sector players, practitioners to share their success stories and approaches in promoting sustainable sanitation in the country and to overcome some of the key challenges. Further it is to define the strategy to scale-up good practices in efficient and effective ways towards making an open-defecation free nation. This national conference is considered as a mini sanitation conference to discuss and carry valuable recommendations of national importance for presentation in the SACOSAN - IV to be held in Sri Lanka during 2011.

Partnership and Collaboration

This national conference is a collaborative event with the efforts of the **Department of Drinking Water Supply, Ministry of Rural Development (GoI), UNICEF, Plan India, SPHERE India, Water Aid, Water for People (WFP), WES-Net India**, who have supported and partnered with WASH Institute in organizing this event.

Conference Theme & Technical Session

In this conference “**Cost Effective Sustainable Sanitation - An Indian Experience**” the lead papers by eminent personalities and experts in sanitation sector is presented in the plenary. Also parallel technical and thematic sessions are held to share the success stories or issues in Sustainable Sanitation in the following key topics:

- Rural Sanitation
- Urban Sanitation
- Ecological Sanitation
- School Sanitation
- Solid and Liquid Waste Management
- Sanitation in Emergency Relief
- Sanitation Demand Creation through Effective Hygiene Promotion

Compilation of abstracts received through call for papers

This compilation includes the abstracts of the papers that have been accepted through the Call for Papers as accompanying material to the full papers for the National Conference on Cost Effective Sustainable Sanitation - An Indian Experience. This will be posted on the WASH website and other websites and is also given to all participants during the Conference as well. Please note that abstracts included here have been taken directly as provided by the respective author(s) and have only undergone basic formatting.

Water, Sanitation and Hygiene (WASH) Institute

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28th June 2010

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Theme

Rural Sanitation

Cost effectiveness of Sanitation - The Gram Vikas Model

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Key words: Sanitation, Cost, appropriate technology

The task is daunting and providing water and sanitation facilities for the billions of un-served populations may seem expensive, but the costs of not providing are much higher. Lack of access to safe drinking water is a major cause of ill-health. Diarrhoea (4,000 child deaths a day) kills more children every year than AIDS, malaria and measles combined (WHO). As fact suggests, one in eight of the world's population (884 million) do not have access to safe water and two fifths (2.6 billion) do not have access to adequate sanitation (WHO/UNICEF). The implications are too high, as at any one time half the hospital beds in developing countries are filled with people suffering from diarrhoea (UNDP). In poor urban settlements and most rural areas, improper disposal of human waste is one of the most obvious contaminant of water bodies. About 3 million deaths each year are attributable to water-borne diseases. Related estimates of morbidity and loss of productivity would comprise a huge cost to the society.

Proponents and policy makers speak of cost recovery principles and affordability, which has direct implications on levels of technology promoted. Somehow poor people seem to be equated with "low-cost". Surely the poor deserve some basic standards as well. There are enough examples of toilet blocks converted into storage units, and not used for what they are designed for. In India for instance, without water in the toilets, the toilets are bound to remain unused. Thus water and environmental sanitation have to be seen in conjunction, whether in rural or urban areas. It is not clear how without one the other would be possible at all. In Gram Vikas's experience it has been observed that, where water storage facilities and round the clock piped supply of water is available to all, people ensure that the systems work effectively and efficiently and system breakdowns are immediately redressed. 100% usage of toilets is also seen among 'first time users' where there is piped water supply to the toilets.

A key consciousness through this is that the process of triggering development among poor communities cannot be equated to 'low cost' it can be 'cost effective' but should deliver the best and

the most appropriate solutions. What is needed is apt and appropriate technology, truly being, that, which is most suited for the situation that the poor are in, and not that which costs less. If it is low cost, it is an added advantage, but that should not be the precondition. In the world of the rural poor appropriate development directly relates to the question of survival on a human plane, and ability to lead a dignified quality of life. A few simple interventions go a long way in lifting these people from the morass of subhuman existence to a life of dignity and quality.

Gram Vikas through its Movement and Action Network for Transformation of Rural Areas (MANTRA) program enables a process of transformation wherein the villagers' dignity and pride is enhanced as they realize that they have something, which several towns in India cannot boast of i.e. full time piped water in each house, toilets and bath rooms. **“Social inclusion, the key to sustainability”**- this is one of the core values that the program follows. A 100% inclusion of all households of a village is a must to start up the programme in the village. Elements devised for sustainability have been tuned to specific contexts with the principles remaining same. The following paper highlights the effectiveness of the MANTRA model in terms of costs and sustainability and makes a point for the need for “social cost” to meet the challenge of the “shame of the Millennium”.

Rural Sanitation

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Toilets are taken for granted and do not get enough attention and respect they deserve. Historically toilets have improved living conditions and even reduced diseases. Sanitation in India is poorly funded, poorly resolved and poorly discussed subject. Through Government has taken up several initiatives in rural areas to bridge the urban-rural divide through its various schemes, yet most of the toilets built under these schemes are makeshift or temporary structures. All great ideas need committed execution, correct evaluation and monitoring of the wider impacts of any such scheme.

Rural toilets mean Low Cost Toilets which are only meant to introduce the rural folk to the concept of toilets so called toilet training for the rural folks.

Such misplaced philosophies end up creating toilets, which are a threat to public hygiene. These makeshift latrines collapse or cave in soon and this compels the rural folk to go back to defecating in the open. If a new sanitation scheme comes up the beneficiaries of previous schemes also queue up for toilets. This way the line never ends. We at ADOPT feel that we need to provide toilets which are workable, hygienic and durable. Otherwise the whole effort becomes ineffective as these people end up needing new toilets to replace the existing temporary ones built under one scheme or other. This is an economic loss to the nation.

In India “women suffer in silence” despite the advances of today's world. It is the women who suffer most from the lack of adequate toilet facilities at home. Women and girls must wait till dark to defecate, exposing themselves to harassment and sexual assault. When we talk about dignity, privacy and social security to the gender then we need to recognize that these makeshift toilets with no proper doors cannot provide that. Moreover these toilets should have a proper bathing space. Through our experience we have found that because of lack of privacy the rural women are not able to bath and clean themselves properly. Many of them suffer from gynecological ailments, which can be avoided through personal cleanliness and hygiene. Where sufficient privacy is not possible it also

affects the adolescent girls who are going through physical changes.

ADOPT has built more than a thousand toilets in the villages of Sahaspur and Vikas Nagar blocks of Dehradun in the State of Uttarakhand. These toilets are workable, durable, hygienic and aesthetically appealing structures. ADOPT builds toilets for individual families which are registered in the name of the women since we perceive that sanitation is a “female territory” and cleanliness starts first with the mother. Women raise and nurture children and carry on the responsibilities of caring for the elderly and the sick. When a women's raised awareness are translated into better hygiene practices, it benefits the children, the elderly, her family and the whole community. Therefore we have involved the women actively in our rural sanitation programme. Better sanitation has impacts on personal safety any day a toilet at home is safer than using a public toilet or open defecation far from home.

ADOPT has used an innovative technology using locally available materials to construct twin pit toilets. The purpose and objective of our Project aptly named “SUVIDHA” is to reduce the drudgery of rural women by building toilets through people's participation.

We have used random rubble masonry which offers a speedier, cost effective, environmentally sound alternative to conventional walling materials. It is based on the principle of densification of a mix of concrete and random rubble to make regular shaped, uniform, high performance masonry unit. The beneficiaries of our project are taught to make the random rubble blocks required to construct the toilet. The whole family is involved in sieving, mixing and casting the blocks. They also assist the mason throughout the construction. They sieve the sand, collect and provide the water for construction, make the concrete mixture, reinforcement tying for the concrete base work as an assistant to the mason. This Project has initiated people's participation to create a sense of ownership amongst the beneficiaries. This sense of ownership, results in rational and judicious use, and there by proper maintenance of the toilets. Toilets built by ADOPT are cost effective because half the cost of the toilet is borne by the beneficiary by their contribution of some building materials, labour and assistance. These inputs result in creating toilets which are cost effective and sustainable.

Our Objectives are to

- Reduce the drudgery of rural women and bring about an Improvement in the general quality of life of the rural people.
- Health Impacts sensitizing Women on impacts of poor & improper sanitation & hygienic practices on health.
- To develop better housekeeping practices on hygiene & sanitation.
- To ensure the participation of women in sanitation related issues, this helps in the development of the village and its surroundings.
- Awareness regarding water borne disease, their source, transmission, prevention and control measures among women to improve the health status of the society.
- Eliminate open defecation to minimize the risk of contamination of drinking water sources & food.
- “Dignity” to the gender.

Rural Sanitation in India: approaches, targets and traps.

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There seems to be a global consensus that sanitation is critical to the well-being of people. And hence a major development issue. This recognition is not entirely new, but the focus and emphasis has enhanced considerably in recent years globally. Investments have increased. There are global targets such as 'halving the population without basic sanitation by half' set as a part of the Millennium Development Goals (MDGs). Sanitation is also seen as being vital to the realisation of most of the other MDGs (Robert Chambers 2009) This paper examines the trajectory of efforts and achievements in rural sanitation in India so far. The analysis is carried out in terms of approaches, investments and outcomes that mark the pathway of rural sanitation in India. The paper argues that there has been a conspicuous absence of genuine learning from experience, which has resulted in huge opportunity costs. This cost is in the form of lost time, misplaced investments, and delays in getting the desired results.

The on-going national rural sanitation program in India, started as a reform initiative in 1999, is known as Total Sanitation Campaign (TSC). The programme in its design is quite forward looking, as it seeks to create open defecation free and fully sanitised communities across the country. A fully sanitised community is envisaged to be one, which is not only open defecation free, but is also engaged in safe disposal of solid and liquid waste, besides taking care of personal hygiene.

The paper argues that there is quite a disconnect between the programme design and its delivery, its intent and outcomes. And the reasons for this disconnect lie on the one hand in approaches and strategies that have been employed, but have not quite worked the way they were intended to and on the other in a singular lack of learning from experience that could have possibly helped improve the programme performance and achieve desired sanitation outcomes in a much more efficient and effective manner.

In conclusion, the paper suggests a possible way forward, which may allow both the central and state governments to be relatively more creative and inventive in seeking the sanitation outcomes, instead of being engaged in target chasing, which more often works as a trap in achieving the real results on the ground.

Sustainable Sanitation through Water Credit Initiatives

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According to the latest study by United Nations Children's Fund and World Health Organization (WHO), around 2.5 million people worldwide defecate in the open, of which 665 million are Indians i.e. nearly, one in four people worldwide. India has the highest number of annual deaths (386,000) of children due to diarrhoea. India's sanitation achievement is abysmal. According to the UNDP HR index, only 33% of the total population has the access to sanitation facilities. The rural picture in this regard is still worst as only 18% is living in a sanitized environment.

As a part of meeting MDG Goal 7- Ensure Environmental Sustainability, Water.org is committed to

ameliorate the water and sanitation standards of **2,30,000** lives by accelerating greater access to safe water and sanitation for those currently living without these basic necessities in India by May 2011. The project was initiated in June 2008 being implemented to the families living in rural and urban India in five states - Andhra Pradesh, Karnataka, Maharashtra, Orissa, and Tamil Nadu. Water.org support NGOs and MFIs of five each totaling 10 partners serving 1,10,000 people through traditional grant and 1,20,000 people through WaterCredit approach. WaterCredit is an innovative initiative that facilitates microcredit loans for water and sanitation and first of its kind in the world. As of March 2010, water.org has served **1,10,000 people** covering 709 communities in the rural villages and urban slums.

Water.org is providing **smart subsidies and credit enhancements** to the credit-based partner organizations, where the Micro Finance Institutions borrow in bulk, directly from commercial banks and then re-lend that capital in smaller and more affordable amounts to the borrowers. The loans are generally distributed through joint-liability groups and women's self-help groups. Thus this approach reaches more people with sanitary latrines than traditional grant support. The NGO partner Organizations construct cost effective models of leach-pit sanitary latrines, eco-san toilets and biogas linked toilets besides conventional models utilizing grant support. In addition to individual household toilets, repairing of Anganwadi toilet, School toilets and Women Sanitary Complex / community based sanitary structures maintained by SHGs.

The methodology followed in all the project villages was starting with baseline survey (pre survey & post survey formulated by water.org), PRA, rapid survey and **GPS survey** besides FGD. A major focus is on software activities for successful completion of individual sanitary latrines through formation of watsan committees on which hygiene education, IEC materials and community mobilization are ensured.

Throughout this program, communities, banks, and local government have significantly contributed to project by cash, labor, and materials. In total, an estimated **\$5.2 million** has been invested. Local contributions have leveraged the scope of this program to reach more people with sanitation improvements. The role of hygiene educators and SHGs / JLGs in each slum/ village is paramount that contributed a lot on operation and maintenance of the assets created in the project and in declaring the communities as Open Defecation Free zones.

Step-by-step: What does it take to achieve sustainable sanitation?

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Introduction: The paper analyses the pioneering civil society initiatives in six states - Chhattisgarh, Gujarat, Karnataka, Madhya Pradesh, Orissa and Tamil Nadu - on sustainable sanitation with support from donor organizations such as UNICEF, WaterAid, Arghyam and the government. The lessons are presented in the context of the challenges faced by government of India's total sanitation campaign (TSC) implemented across the country. The initiatives listed in this paper are implemented in a programme mode rather than a project mode and lay emphasis on process (allotting adequate time for behavioural change and person-to-person campaigns). It is important to note that the grassroots experiences and inferences presented pertain to specific local conditions. The wide socio-economic and cultural diversity of India defies blanket solutions.

In all these cases analyzed, the time, human resources and financial resources invested for imparting sustainability is analyzed. Moreover, based on the case studies analyzed, an attempt is made to divide the sanitation campaign into four phases—pre-planning, planning, implementation and sustainability (ensuring sustained usage). Each phase involves a series of social, technical, financial and institutional activities as presented in the concluding section. The paper attempts at drawing up a checklist of activities to be undertaken in each stage.

Highlights of the paper are presented below:

a. Sustainability Indicators: Sustainability of a sanitation campaign hinges on not only the hardware, but also the software, and governance aspects associated with it. A close look at the TSC reveals that three critical elements must be strengthened to ensure its sustainability:

- **Software:** Social and institutional software for social mobilization, IEC, capacity building.
- **Hardware:** Appropriate technology selection (paper explains what works where and the best practices in addressing issues of costs, water availability and space), integration with water management etc.
- **Governance:** Integrated and participatory planning, institution building and financial models that cut across social, technical and institutional issues.

As various national and international organizations define sustainable sanitation differently, this paper refrains from defining the term, instead seeks to present the lenses and indicators of sustainability. The paper makes an attempt to present the elements or blocks of sustainability cutting across social, technical, financial, institutional and environmental aspects. Based on the case studies and their impressions indicators of a sustainable sanitation village are presented.

b. Phases of a sustainable sanitation campaign: The paper, based on the case studies analyzed, suggests that a successful and sustainable programme may be broadly divided into four phases spread over three to five years. There are broadly four phases—pre-planning, planning, implementation and sustainability

** May take up to 60 months depending on demand generation.*

c. Resources: This section analyses the human and financial resource requirement of the campaign during different phases.

- **Human resources:** The paper seeks to understand the human resource requirements of a sustainable sanitation programme based on the case studies analysed. It presents a comparison of the institutional model and the investment made by different NGOs in human resources during different phases.
- **Financial resources:** The paper analyses the hardware: software ratios, and the phase wise investments. The data suggests that most of the investment happens during the implementation phase (60-75% of total). Phases like pre-planning (5-15%), planning (10-30%) and sustainability (5-20%) gets almost the same attention in the programmes analysed unlike the state driven sanitation programme.

d. Conclusion: The paper presents a framework of activities to be undertaken in each of the four phases needed to ensure social, technical, financial, institutional sustainability of the sanitation campaign.

"A Reality Check on Sanitation at the Grass Roots"

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The paper will share the experience of initiating a village sanitation project and offer some solutions on how sustainable sanitation at the grassroots level can be promoted based on the project's experience. The paper details the various obstacles that had to be overcome before the project could be implemented, examine why these problems were faced, discuss the methodology of how the project was implemented and finally share with the participants some out-of-the-box innovative solutions used to overcome the challenges.

Low cost waste water disposal system: A step towards healthy villages

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Mewat district of Haryana falls in semi-arid regions of India, with the Aravali hill range cutting across it. Fresh ground water is found only at the foothills of the Aravali, the rest being mostly brackish. The availability and quality of water is a primary concern in the region. Availability of fresh water is becoming precarious in the wake of rapid depletion of fresh water resources. This is significantly affecting the poor with the magnitude of impact being higher on the agricultural economy and animal husbandry, also increasing the drudgery of women and causing health problems.

The SM Sehgal Foundation has taken up the challenge of working in Mewat to address the problem of water scarcity. While working on the issues of water availability and quality with the conservative community, the learning has primarily been that unless the sanitation part is also taken up with these issues, the problem cannot be addressed completely. Like in any other rural areas, in Mewat as well, domestic waste water flows into the streets, creating dirty puddles which becomes a breeding ground for pathogens and their carriers. With the prevailing practices of open defecation, open composting and excessive use of chemical fertilizers and pesticides in agriculture, the waste water generated also leads to ground water contamination. To address the issue, the Foundation adopted soak pits with an innovative design to handle the silt load at house hold level leading to a safe disposal of waste water. A scaled up version of soak pit called the soak well has also been adopted for a cluster of households where due to shortage of space or for any other reason, soak pits could not be constructed. Doing so, the streets have become dry and clean, as a result the population of mosquitoes, flies and other insects have dwindled which has drastically reduced the incidence of water and vector borne diseases. More and more people are coming forward to adopt this approach. It has not only created a clean and hygienic environment in the village but has also helped people realize the importance of water conservation.

Drivers and Barriers towards achieving 100% sanitation

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This paper discusses drivers and barriers towards achieving 100% sanitation coverage which could contribute significantly in progressing towards Millennium Development Goal targets of extending safe water and basic sanitation to all. The paper will highlight findings which are based on implementation of Environment Health Improvement Program (EHIP) in 50 villages located in Patan and Junagadh districts of Gujarat. EHIP was a three-year program initiated in January 2007 and designed to improve the health and well being of 83,000 persons living in 50 villages. The Aga Khan Planning and Building Service, India (AKPBS,I) with support from the Aga Khan Foundation (AKF) has implemented this program which aimed to establish a sustainable community managed integrated system for water supply, sanitation and hygiene through 'village coverage approach' with the involvement of local communities, especially women; through introduction of low cost technology and hygiene promotion. One of the major outputs envisaged was 100% access to sanitation in all the selected villages, leading to 50 Open- Defecation Free Villages.

This paper analyzes the socioeconomic, political, and environmental problems of providing access to improved sanitation services in rural areas. Throughout the three- year duration of EHIP, many useful lessons were learnt from experiences as well as the various challenges posed such as, technical and design issues, delivery of project software which including hygiene, and overall program management. The construction component yielded important lessons relative not only to the activity itself, but also to design, cost and subsidy issues.

The achievements of project targets in a relatively narrow time frame have been demonstrated in EHIP. This success can be attributed to, besides other factors, definition of clear and focused objectives and planning timelines, constant monitoring, assessment, and reassertion of planning targets the paper concludes with some proposals on how to overcome identified barriers for improving water and sanitation services to achieve access to sanitation to all.

Piloting Community Led sanitation (CLTS) Approach to Sanitation In Orissa: A Case Study

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The Capacity Building Division of Feedback Ventures has been hired by the Government of Orissa to pilot Community Led Total Sanitation (CLTS) approach to support the Total Sanitation Campaign (TSC) program of the Govt. of India. The pilot covers 2 blocks of Orissa - Pallahada in Angul district and Dasmanthpur in Koraput district. The purpose of this pilot is to make the two blocks Open Defecation Free (ODF) without any external assistance or subsidy.

Feedback's experience with this pilot has been very encouraging. Not only have the communities [about 20 villages till date] attained ODF status but they are slowly graduating towards other safe hygiene practices as well. Technologies have been designed by the communities themselves which range from no cost to low cost options. The community behaviours are being monitored by natural

leaders periodically. Regular visits by government functionaries have helped in scaling up the approach in neighbouring villages.

The pilot has had the biggest impact on the government. The TSC program, which has traditionally been a low priority program across the country, has received a huge impetus. The administration from both the State and the districts has been visiting these communities to understand the processes followed in the pilot and how these can be applied to other rural development programs.

The presentation will discuss broadly the approach & methodology of the pilot as well as the key learnings. It will also dwell upon the challenges in scaling up the TSC program to ensure sustainability of the behaviour change.

Marketing Sanitation In Rural India

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Access to sanitation - the hygienic disposal of human excreta has been largely achieved through the private sector supplying individual households. Sanitation coverage is usually defined in terms of the percentage of households having access to a sanitary latrine. In India, despite concerted attempts by the central Government, total sanitation coverage stands at 14 per cent of rural households. However, research shows that many of these latrines are not being used for their intended purpose.

It is very important to motivate people to change poor hygiene practices by providing the proper incentives and products which can be done through marketing the health and non-health benefits of sanitation and providing products across a range of prices. Evidence from what works indicates that development of the market is the only sustainable approach to meeting the need for sanitation in the developing world. Tackling the millennium sanitation goal calls for fresh thinking and innovative approaches. Marketing sanitation, building on perceived benefits, offers an innovative approach to ensure that communities have access to safer services. Social marketing uses marketing techniques to serve social objectives. Marketing goes far beyond mere advertising. It is often said to have four components, the four Ps; product, price, place and promotion.

This paper explains the marketing approach and suggests that it should be promoted as a central feature of sanitation improvement programs. It starts with an introduction on benefits of sanitation, the public and private dimensions, the reasons why people do not prefer sanitation structures, the social marketing for sanitation, the process of social marketing, etc. The marketing of sanitation offers a whole new approach to ensuring that people get toilets. This implies rethinking the role of the public and private sector, so that it harnesses the power of the market and helps it to do its job. The market is the most suitable vehicle to get us to the millennium sanitation goal.

People centric approach in sanitation - a successful initiative in Tiruchirappalli

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Many international organizations, Government and Non-Governmental organizations are working for the promotion of water and sanitation activities in the rural, urban including coastal and tribal areas. Gramalaya is one such organizations working for water and sanitation initiatives in India, especially in Tiruchirappalli region of Tamil Nadu. Gramalaya believes that health development would accelerate the income of the people thereby economic development would take place and economic development would result in social development. Gramalaya's triad strategy emphasizes health improvement that leads to economic development and economic development help the communities to achieve social development whereby the communities are entrusted, entitled and empowered.

Gramalaya projects are aimed at stopping open defecation in the intervention areas which include rural and urban slums in Cities. Gramalaya enabled the panchayat to declare India's first village Thandavampatti as open defecation free (ODF) village in Tiruchirappalli District where the panchayat passed a resolution in the grama sabha meeting. Based on the community led total sanitation approach, Gramalaya so far helped the local communities to declare 56 panchayats as ODF with the assistance from the district officials under Total Sanitation Campaign scheme.

The project implemented in the three blocks of Thottiyam, Thathaiengarpet and Thuraiyur Block in Tiruchirappalli District of Tamil Nadu resulted in overwhelming response from different stakeholders like the community based organizations who are the Panchayat-level federation of women's self-help groups, school children, PRIs, Total Sanitation Campaign, Sarva Shiksha Abhiyan and the bankers in the operational area. As an outcome of the project, the entire block of Thathaiengarpet declared as ODF villages. This enabled the district administration to apply for the Nirmal Gram Purashkar Award of the central government for the block-level approach.

The community especially women, were organised into SHGs and these SHGs were federated at Villages, Panchayat and Block level. Other community based organisations which were promoted included men's groups and children's groups, though these were basically targeted for behaviour change communications. The women federations and the schools were the platform on which the sanitation promotion programme was launched. The federation leaders were trained on mobilizing women, linkage with bank and other financial institutions and also in interfacing with local Governments. The communities were facilitated to organise themselves, identify the issues and possible ways of addressing them. The federation leaders led the need assessment process, and they resolved to achieve for all people in the operational areas have equal right to access to safe water, sanitation, health and improved income status without discrimination of caste, class, gender and region.

Based on the need assessment carried out through the community, Gramalaya had developed its interventions for the community that would promote health and hygiene with focus on sanitation. The project plan adopted a development approach aiming to empower the communities helping them to improve their health, living standards and environment. The underlying belief of the initiatives is that health empowerment would in turn lead to economic and social upliftment that would give people the power to alleviate poverty caused by water and sanitation related morbidity and issues. Participatory behaviour change communication, Community and local government capacity building and financing option through microcredit were the three major strategies adopted to achieve the objectives set.

The District Administration through the Total Sanitation Campaign supported Gramalaya in releasing subsidy for the constructed toilets. The toilets constructed were monitored by the officials at the block and district level, they also participated and endorsed the village Open defecation free declaration organised by people in association with elected representatives. Encouragement and support has been extended by the Member of Legislative Assembly and the state ministers. The Panchayat chairman and the Presidents monitored coverage and usage before declaring the village as open defecation free, they proudly erected sign boards in important locations, and also promulgated an order of fine for anybody found defecating in the open. Child brigade was made responsible for monitoring. The District Collector participated in the Panchayat-level Federation meeting of women self-help groups and appreciated the combined efforts of TSC, women self-help groups, bankers and the NGO Gramalaya.

Loans from the commercial banks and Primary Agricultural Co-operative societies to the women Self-Help Groups enabled the communities to construct household toilets. The communities were enabled to access technical support through the toilet technology centre which housed different toilet models. With the help of trained cement fabricators and masons 45,000 household latrines were constructed with a total loan amount of Rs.12.26 crores from 2005 to 2009. The entire project was facilitated by Gramalaya where the community involved in achieving the goal of sanitation for all.

Theme

Urban Sanitation

Residents Knowledge, Behaviour and Practices of Municipal Solid Waste Management (MSWM) in Chandigarh and Hyderabad

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Keywords: Resident's Knowledge, Behaviour and Practices, Mean Household Level Score, Bin Usage Practices, Residents Opinion on Private Sector Participation.

Background: A comparative study for Chandigarh and Hyderabad was undertaken at all the levels of MSWM (that is collection, storage, segregation, transportation, processing and disposal) in the backdrop of the Municipal Solid Waste Management Rules (MSWM) 2000. The Rule 2000 has given detailed guidelines for local bodies all over India for all the level of MSWM with some deadlines. This paper focuses on the resident's knowledge, behaviour and practices regarding municipal solid waste (MSW). Various innovative initiatives have also been undertaken at Chandigarh and Hyderabad to improve the MSWM.

Objectives: To compare the resident's knowledge, behaviour and practices at the household level MSWM.

Material and Methods: 300 observations and a cross sectional survey (300 households per city) was done in Chandigarh and Hyderabad using multistage sampling technique. Both cities were divided into 4 zones (by their respective local bodies). Three units were randomly selected from each of the 4 zones. Then in the next stage, each unit was sub-divided into 4 sub-units. Thus total 25 households

were consecutively interviewed and observed in each unit in a single visit. Mean scores at the household level were computed using the delphi-validated MSWM Score Sheet. SPSS 16.0 was used for data analysis.

Results: In Chandigarh, place where waste was kept was observed clean 84.4% (249) and in Hyderabad it was 88.6% (257). In Chandigarh 73% residents kept the waste in kitchen and 62% in the verandah as compared to Hyderabad where waste was mainly kept at verandah (50%) and backyard (25%). 53% respondents in Chandigarh told that they use covered dustbins as compared to 34% in Hyderabad ($p < 0.001$) though during the actual observations, in Chandigarh covered bin usage was 32% and in Hyderabad 34% ($p = 0.8$). Significant difference ($p < 0.001$) was observed regarding the usage of polythene bags for waste keeping in Chandigarh and Hyderabad. In Chandigarh it was 61.3% (184) and in Hyderabad it was 75% (225). In Chandigarh 99% (298) respondents had knowledge regarding MSWM as compared to 89% (266) in Hyderabad ($p < .001$). Mean score for the waste collection practices at the household level in Chandigarh was 4.25 and in Hyderabad it was 4.09 ($p = 0.1$). Private sector would perform better as compared to public sector in providing MSWM services by 63 % (189) respondents in Chandigarh as compared to 40% (121) in Hyderabad ($p < .001$).

Conclusion: Efficiency of overall MSWM was good at household level was satisfactory at both the cities though better household level waste management in Chandigarh as compare to Hyderabad. Significantly more people were aware about MSWM in Chandigarh in comparison with Hyderabad. Bin usage was observed at both the places but more open bins at Hyderabad and more covered ones at Chandigarh. Less Hyderabad people felt that private sector would perform better in comparison with government sector in providing MSWM services.

Comparison of Sanitation and Wastewater Treatment Technologies: Case Studies from India

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This paper reports about the results of an evaluation of sanitation systems in India. The following sanitation systems were assessed: septic tanks, communal ECOSAN systems, biogas toilets, solid immobilised biofilter, multiple stage filtration and DEWATS. The evaluation has been based on a rapid assessment looking at whether the systems comply with their intended benefits, and more in depth evaluations on cultural, economic and/or hygienic aspects where the rapid assessment has not provided sufficient knowledge.

This paper presents the result of an evaluation of selected sanitation and wastewater treatment technologies across India. In this study a pragmatic approach was used to assess the technologies. Rather than setting up an evaluation framework comprised of a number of criteria and indicators which then is applied uniformly across all case studies, the indicators and criteria used for the evaluation were defined in a bottom up way for each selected technology, following the methodology described

below. Reasons for success as well as factors for failure were analyzed and crucial aspects for the successful implementation of sanitation and wastewater treatment technologies were identified.

Factors Influencing Farmers' Willingness To Adopt Best Management Practices to Protect Groundwater from Nonpoint Sources of Pollution: A Case Study in the lower Bhavani River Basin, Tamilnadu

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Pollution abatement strategies for water resources in India and other developing countries have given priority to *point sources* of pollution. However, it is increasingly becoming evident that improvement of quality of surface and ground water resources will also require the control of pollution from *nonpoint sources* (NPS). Nonpoint source water pollution control is particularly crucial in rural areas where groundwater is an important source of drinking water. In several parts of India, growing access to irrigation facilities along with unbalanced and overuse of nitrogenous fertilizers, unlined and open storage of livestock wastes, and insanitary disposal of human wastes have led to high concentration of nitrate in groundwater.

The objective of this study was to capture/ understand the factors which influence farmers' willingness to adopt Best Management Practices (BMPs) for human and livestock waste management to protect groundwater from nonpoint sources of pollution. Based on long-term groundwater nitrate concentrations and sources of irrigation, six villages are identified in the basin and a pre-structured questionnaire survey (face-to-face interviews) has been administered to 395 farm-households across the villages.

The results show that farmer's age, education and per capita land holding positively influence their willingness to construct latrines. Farmers who believe that unlined storage of human waste pollutes groundwater are willing. The farmers' social network in the form of memberships in social-participatory institutions and sources of agriculture related consultations positively influence their willingness.

Farmers who believe that open defecation pollutes groundwater quality are also willing to avail of government support to construct proper latrines and toilet facilities within the house. Farmers from severely groundwater-polluted villages are willing to avail of government support, whereas farmers from moderately polluted villages are reluctant. Farmers' knowledge about biogas plant is an important determinant of their willingness. Farmers who understand that reduction of fertilizer and pesticide application rates could protect groundwater quality are willing to construct biogas plant. Farmers having larger herd size, larger area under sugar cane cultivation, better drinking water quality of their own source are willing. Given all other factors, adoption of biogas plant is area specific. It is due to the fact that farmers' affordability to maintain a larger herd size varies across villages depending on the availability of area under grazing land (common property resource).

Therefore, the sensitization of the rural population on health and environmental aspects of human and livestock waste management practices could encourage the farmers to adopt BMPs. The methodology of doing this could form the basis of further study.

Emerging Issues and recommendations from the National Urban workshop

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By 2021 one third of the population in the country will be living in urban areas from the current level of 28% signifying an increase of 147 million urban dwellers (from 286 to 433 million). This trend of urbanization has been characterized by continued concentration of urban population in large and existing cities and spatial variations in urbanization across the states and cities. The escalating urban growth has severely stressed access to infrastructure services. There is absolute shortage of infrastructure of services in urban areas. The access to these services is also subject to inequitable distribution across different income groups. Studies show that India accounts for up to 60% of the urban poor. There is a kind of cold shoulder attitude towards the habitants of the un-notified slums. They are not considered in the gamut of planning for provisions of basic services.

Interventions have largely been slum centric with an absence of any consideration to the overall plans for the city with an overpowering welfare approach. Though the 74th Amendment talks about the ULBs devolving power and emphasizing WATSAN to be one of the functional areas the ground reality is disparate. Decentralization is a very slow process and thus planning and implementation is rested in the hands of the government with ULBs taking the onus for O&M. The ULBs having a weak system have rested back the O&M to government. The ULB's with little capacities, less staff, inadequate financial standing and no accountability mechanisms has led to low services provided to the urban poor.

WaterAid, UN- Habitat & Government of Madhya Pradesh jointly organized a National Urban Workshop on 3rd, 4th & 5th March 2009. The objective of the workshop was to discuss the key issues and gaps in the existing system, to understand the urban water and sanitation policy environment vis-à-vis the poor, to understand the challenges of providing water and sanitation to the urban poor. There were existing pro poor approaches from which learning's could be derived to further scale up the program.

The workshop was a platform to develop understanding on different approaches and come out with some good recommendations that would help ensure equitable water supply and sanitation to the urban poor. Sector experts made presentations on the key issues of water and sanitation in the urban areas and also shared their learning and best practices.

The workshop provided with recommendations that could be shared at a wider level. These were for both Government and civil society organizations. These recommendations were to guide action at different levels, within organizations and with governments at local, district, state and national levels.

The paper will further delve into the key issues and the recommendations produced during the workshop that can be taken up to ensure the urban poor are into the mainstream and have access to basic services.

Urban sanitation

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In India, 30.66 million household i.e. nearly 35% of the household in urban area do not have adequate access to sanitation facilities at home. Besides loss of human dignity it has severe impact on environment and health. Lack of sanitation facility and unscientific disposal of waste leads to contamination of surface and ground water. Recurrence of diseases among the people also results in loss to man days of working population to the country. The problem is acute as we are not able to eradicate the problem of Polio from many States in India. Extensive campaign has been launched all over the country where the Actor of the Millennium Mr Amitabh Bachhan pleads to the fellow citizens to take their children for vaccination but to little result in the affected neighboring areas adjoining Delhi.

This has also adversely affected the Sarva Shiksha Abhiyan campaign carried out for years by the Education Department. Studies have often revealed that number of children especially girls drop out of schools as there is no provision of toilets in their schools. Many school administrators keep toilets locked due to difficulty in cleaning them, some toilets are blocked due to littering in the WC, and certain other toilets are out of use due to non connection of water pipes. Efforts have been made by the government to ensure that there are toilets for school children and that there is provision of separate toilets for girls and boys. The loss due to disease arising out of poor sanitation for children under 14 years of age in urban areas alone is estimated at Rs. 500 crores.

The private schools run in big cities do not see this as a problem but it is to be understood that only 7% of the total schools running in the country are private in nature while the remaining 93% are government schools especially in far flung and rural areas.

The National Urban Sanitation Policy was formulated by the Ministry of Urban Development in the year 2008 which was declared the International Year of Sanitation by the United Nations. The vision for urban sanitation in India is, "All Indian cities and towns become totally sanitized, healthy and livable and ensure and sustain good public health and environmental outcomes for all their citizens with special focus on hygienic and affordable sanitation facilities for the urban poor and women". The goal can only be met through awareness generation, behavior change, ensuring open defecation free cities and focus on sanitation and waste management.

Lot of effort in respect to sanitation has been done by the Ministry of Rural Development under the programme of Total Sanitation campaign. When the campaign started in the year 1981 it was just 1% but now with the excessive efforts made by the Department of Drinking Water Supply there are nearly 64% people in rural India who have access to sanitation facilities. But the situation is not the same in urban areas. The situation is all the more grim in Delhi as a large number of people here reside in urban slums, unauthorized colonies, de-notified areas and *jhuggi jhopri* clusters. Nearly 30% of the population of the city lives below the poverty line and the infrastructure for water and sewage here is extremely low. Most of them do not have provision of individual toilets as there is no place to build them. As far as community toilets are concerned they are very less in number, over crowded, and dirty. These people are found defecating near the nallahs, railway tract, open land, landfill and dhallaus. Since the area is limited they are forced to use the same place over and over again which adds on to filth and unhygienic conditions for the poor.

Lack of sanitation and hygiene is a public disaster that deserves the highest priority. Access to sanitation facility is a fundamental right that safeguards health and human dignity. The concept of sanitation was earlier limited to disposal of human excreta and construction of lavatories. Today, it

includes personal hygiene, safe water, human excreta disposal, waste water disposal, solid waste disposal, food hygiene and environmental sanitation. There is need to sanitize people on the concept of 3 R's of Reduce, Reuse and Recycle.

My paper will be focused on Urban Sanitation with special emphasis on Delhi where the migratory population is found in large number. They come to Delhi looking for a living and are obviously in need of food, clothing and shelter. They start their living in Delhi around flyovers and end in slums. In any of these places there is no toilet facility and they are forced to live in the most unhygienic conditions which are well reflected in their health.

As per the current records 12.04 million defecate in open, 5.48 million use community latrines while nearly 13.4 million household uses shared latrines. 12.47 million household do not have access to drainage network while 26.83 million households are connected to open drains. More than 37% of total human excreta generated in urban India are unsafely disposed. It imposes significant public health and environment costs to urban areas that contribute more than 60% of the country's GDP. It is to be noted here that inadequate discharge of untreated domestic municipal waste water has resulted in contamination of 75% of all surface water across India. Under the Millennium Development Goals India has promised to provide access to improved sanitation to at least half of the urban population by 2015 and 100% access by 2025. Although rural India is marching fast to achieve the goal through their TSC programme urban India is left far behind. It is time to think, frame rules, issue policy guidelines, create awareness, infrastructure and bring about behavior change in case we do not want to be let down before the other in achieving the MDG.

Urban Sanitation

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Over the years, the environment has deteriorated because of unplanned urbanization and industrialization. The number of people in urban areas without improved sanitation is increasing because of rapid growth in urban population. In India, till the late sixties, sanitation and toilet was a subject of cultural taboo and it still continues to be so to some extent. It was a cultural, social, technological and economic problem. In public places there was no provision of public toilets. Women had to suffer the most. In urban areas only sewerage or septic tank systems and bucket toilets were prevalent. Those who used to clean toilets and carry human excreta manually used to be called 'untouchable human scavengers' and had to suffer all sorts of insults and humiliation because of their dehumanizing work.

To overcome the problem of safe disposal of human waste, in 1970, Dr. Bindeshwar Pathak, Founder, Sulabh Sanitation and Social Reform Movement, invented, innovated and developed two technologies. The first technology of two-pit, pour-flush, compost toilet, popularly known as Sulabh Shauchalaya, is scientifically appropriate, economically affordable, and culturally acceptable and conserves water, requiring only 1 to 1.5 litre of water for flushing. No scavengers are required to clean the pits. The other technology is for recycling and safe reuse of human wastes from public toilets through biogas generation. Biogas can be used for lighting mantle lamps, cooking food, warming oneself during winters and power generation. The water discharged from the biogas digester is treated through Sulabh Effluent Treatment technology, which is simple and convenient, for its safe reuse as bio-fertilizer or discharge into rivers/water bodies, without polluting them.

Sulabh has installed 1.2 million toilets in individual houses and the Government of India has got installed more than 54 million toilets based on Sulabh technology. Besides more than 7000 public toilets have been installed and are maintained on 'pay and use' basis throughout India. The above sustainable and cost-effective, patent-free technologies have been replicated over the last four decades and recognized nationally and internationally and recommended for worldwide replication by UNDP in the Human Development Reports of 2003 and 2006. The Sulabh sanitation technologies also substantially reduce global warming because of less emission of gases into the atmosphere.

With the implementation of Sulabh on-site technologies scavengers have been liberated, rehabilitated in other occupations with educational and vocational training and brought into the mainstream of society. Thus their human dignity has been restored. Of the 1 million scavengers only 13,000 remain to be relieved. 640 cities have been made scavenging-free. Sulabh has been able to change the attitudes and behaviour of the Indian people towards toilets and 'untouchable' human scavengers.

Sulabh has contributed significantly in improvement of urban health in India by providing 1.2 million household toilets in 1499 Indian towns/cities and also by maintaining 'pay and use' public toilets, both of which are used by more than 10 million people daily. Improvement of the urban environment will promote healthy life for the millions of citizens living in urban areas, particularly the poor and the under-privileged.

An Innovative and Sustainable Approach Towards Urban Sanitation: A Study On A Suburban Municipality Of Chennai.

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Key Words: Sanitation, Sustainable, Cost effective, Public-Private-Partnership,
Community Participation

During the post-globalization era most of the developing countries have been experiencing rapid urbanization. The concentration of humanities in relatively small spaces brings enormous pressure to the local administration in providing the basic infrastructure including sanitation. Globally 2.6 billion people live without improved sanitation. Sanitation coverage in developing countries (49%) is less than the developed world (98%). In developing countries, particularly in urban areas, inadequate sanitation and open defecation creates unpleasant living conditions and health risks. The estimated number of deaths due to poor sanitation was 1.6 million/year. Recently the suburban areas (Municipalities/ Panchayats) of Chennai city have been expanding rapidly with high rate of population growth. Since suburban areas are located outside the city, most of the metropolitan services are excluded. Besides smaller administrative units have huge constraints in introducing/extending urban services, including sanitation. In this context the innovative sanitation project in Alandur municipality is an exception.

Alandur (19.5 km²), located 14 km away from the southern part of Chennai city, developed as a residential suburb has a population of 146,154. Approximately one-fourth of its population lives in slums. Alandur had no underground sewerage systems. Households had either septic/holding tanks, and the municipality was responsible for collecting the sewage periodically in tankers and disposing in

low-lying areas. It created huge environmental/hygiene problems including drinking water contamination and health risks. To overtake this, a Public-Private-Partnership sewage project with community participation was designed in late 1990's. The municipal officials widely disseminate the need for a comprehensive and cost effective sewage scheme through campaigns. The project includes: installation of underground sewage line around 120 kilometres, construction of pumping houses and a sewage treatment plant (24 MLD capacity). The project was undertaken by a private company under 'Build Operate and Transfer' base for 14 years. The estimated cost was Rs.340 million (Rs.100 million as citizen's contribution/deposits and Rs.240 million loans/grants from state financing bodies). Rs.5000 was collected as deposits from each household. Besides, the monthly tariff fixed as Rs.110, which primarily used for mitigating the maintenance cost and repayment of the loans. At the end of 2008 all households (32,000) became the part of the project. Alandur sewerage project is an innovative initiative for sustainable delivery of urban sanitation services in cost effective manner in the country. The experience demonstrates that mobilizing people's participation for infrastructure projects is possible through effective leadership, collective efforts and transparent procedures.

Water, Environment and Public Health In Under-Privileged Peri-Urban Communities. The Case Of Mylai Balaji Nagar, Chennai

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In response to unprecedented rural to urban migration, new forms of urban organization have in recent years begun to emerge in large Indian cities. Because of greater connectivity and increasing urban development, settlements have been shifting to the urban periphery. However, in many places the extension of essential municipal services to both formal and informal peri-urban settlements continues to lag far behind growth. In the case of inadequate centralized safe water supply and sanitary network coverage, this gap results in considerable economic and public health impacts. Decentralized alternatives for safe water supply and sanitation could represent an interim strategy to improve coverage and achieve immediate health gains, especially amongst low-income and/or informal peri-urban communities. This paper will introduce a research project exploring alternative approaches for safe water provision in low-income peri-urban communities, illustrated through a case study of a community called Mylai Balaji Nagar in south Chennai. This paper will present interim findings on environmental water quality and water-related disease epidemiology, explore potential alternative strategies for safe water provision, and discuss challenges facing such alternatives in the context of the case study community.

Rights of Citizen: The Delhi way of doing it

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Cities in India have been growing, rapidly but inequitably, over the years, leaving its urban poor to languish in substandard settlements with minimum services. Most reside in informal urban settlements and slums, defined by the UN as communities in which there is no security of tenure, no access to improved water and sanitation, or where dwellings are made of non durable materials or are overcrowded (more than 3 people per room). Even where slum dwellers have access to water and sanitation, this does not mean adequate services; water supplies are often intermittent, low pressure, insufficient, expensive or of poor quality. In some communities, water supplies are controlled by a mafia who make illegal connections to the public network, charge exorbitant prices and use violence to discourage other providers. Significant proportions of slum dwellers meet their sanitation needs using shared public or community latrines often poorly managed and filthy. Due to lack of timely collection and removal, solid waste finds its way into the drains resulting in stagnation of sullage and local flooding.

Expanding services into poor urban areas requires improving the water utilities and sanitation systems and strengthening community organizations, municipalities and local entrepreneurs. There are several administrative issues for which solutions cannot be obtained overnight. This paper looks at a workable model for urban poor within the existing system.

Community contracting is an approach to deliver improved services where the communities are empowered to take more control of these services and in turn take more control of their lives. This process changes the community from a recipient of development to a partner in development. It is tool for community empowerment and a process that ensures both social and economic accountability. Community contracting/control is an established approach for WaterAid India (WAI) historically and also in current commitment on Rights. Three different approaches have been used as indicated below:

1. Communities in poor settlements have been empowered to negotiate with duty bearers (the Delhi Development Authority or DDA) in influencing the cancellation of private contractors dealing in drain and street cleaning. Having demonstrated their efficiency and credibility, the DDA is now open to sub- letting the management of community toilets to the community.
2. Successful demonstration of community supervision of the O&M of community toilets contracted out to private operators. The community monitoring system, because of its efficiency has paved way for community voices at the system's level and is now being assessed for adoption on a citywide scale as a regular feedback mechanism for the Municipal Corporation of Delhi (MCD).
3. Effective use of RTI to make the Government system work. The government staffs responsible for community toilet cleaning, maintenance of streets and drains have become more accountable to their jobs.

This paper will describe the experience, the approach used and the lessons learnt.

Vacuum Sewerage - A modern system aiding to reduce the costs of Communal Wastewater Collection

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The disposal of sewage to a central treatment plant in sparsely populated and flat areas often fails due to high specific costs. In recent years alternative wastewater collection systems have been set on the market with great success. Vacuum sewerage systems are nowadays a sophisticated and reliable alternative when well designed. Particularly in regards to first investment, vacuum sewerage systems often offer more feasible solutions, also in the long run. Due to a lack of information and prejudices concerning operation of alternative sewerage systems, planners and decision makers often hesitate to take these technologies into consideration. However, vacuum technology, for example, offered by ROEVAC® has grown enormously in the last years. This article is based on a project work (thesis), which has been accomplished at the Institute of Hydraulic Construction at the University "La Sapienza", Roma as well as at the "Institut für Siedlungswasserwirtschaft", Universität Karlsruhe in 1998. Technical details, risks, chances and potentials of vacuum sewerage as an alternative for municipal wastewater collection systems have been carefully researched and are presented in the following paragraphs.

Facilitating Sanitation Facilities For The Poor: UN-HABITAT Interventions In India

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UN-HABITAT through its Water for Asian cities (WAC) Programme is contributing towards enabling access of the poor to improved water and sanitation services by promoting pro-poor governance, water demand management, increased attention to environmental sanitation, and income generation activities linked to water supply and sanitation. In India Water for Asian Cities Programme is being implemented since 2005. At present, it has presence in 5 cities /towns in Madhya Pradesh, 5 districts in West Bengal, Cuddalore district in Tamil Nadu, Mangalore in Karnataka and Madhepura district in Bihar. This paper highlights interventions made towards facilitating sanitation facilities for the poor.

Urbanising ECOSAN in Tamilnadu

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Background:

In the event of continuing exploitation of natural resources, play a vital role on the living condition of the people and the environment. This Ecological Sanitation is a growing concern among the NGOs and

Govt. of Tamil Nadu hence they look to find out an enduring solution to these issues. 'ECOSAN' concept, Human waste has been identified as a valuable resource. The ECOSAN products like compost manure and urine has rich in essential nutrients needed for plant growth.

In rural areas of Tamil Nadu many initiatives has been taken by many NGOs with the help of donor agencies and Government. But in the case of Urban intervention no such initiative happend in Tamil Nadu. The proposed 'Urbanising ECOSAN in Tamil nadu' has the following components to implement in Chennai metro.

Key Areas:

- Study on urbanising ECOSAN in Chennai Metro.
- Sensitizing Builders to construct ECOSAN toilet.
- Marketing of ECOSAN Products.

The Study on Urbanizing ECOSAN in Chennai Metro:

The Study on Urbanizing ECOSAN in Chennai Metro to be conducted by Shabnam Resources to know the following aspects of ECOSAN.

- Level of awareness among the various stakeholders of urban community on ECOSAN and importance of healthy way of using ECOSAN products.
- To explore the reality of ECOSAN situation that to be constructed in the apartment buildings.
- To pave ways and means for ECOSAN manure in the urban and rural areas through youth marketing dealership Endeavour's.

Sensitizing builders to construct ECOSAN toilet

The need for ECOSAN toilets is more important in the metros along with rural areas. The metro sewage treatment many times turn to be questionable and outbreaks of diseases have become eventful, comprehending these issues, it would be ideal to thrust upon introducing ECOSAN toilets for the newer constructions in Indian metros. These toilets would not only address growing water acuteness, besides it would be hygienic and clean.

Marketing of ECOSAN Products

The collection and redistribution of ECOSAN Products should be well regulated, and branded as organic manures which in turn can be marketed in towns and villages.

Marketing strategies: There would be many franchisees; mostly unemployed youth who would be well trained for marketing the product, where by the unwanted migration of rural population can be checked. There would be special schemes and pricing structures, promotions of product awareness including advertisements, product launch, and scheme operations would be followed later.

Time-line: The proposed pilot study is meant for one year.

Project Area: The project area of this project is Chennai to begin with and later addressed in other metros too.

A Case Study of Hyderabad

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May I first of all introduce myself, I am Olusegun Adebawale Adeogun, a Nigerian, a water engineer by profession with 18years of working experience in water and sanitation sector, and recently had a plumbing systems design training at Institute of Piping Engineering and Building Services (IPEBS) at Hyderabad and now back to my country.

Hyderabad the way I see it

It is said to be the capital city of Andhra Pradesh State, a beautiful city with friendly and accommodating people, it has better and habitable environment if compared with other cities of the world with large populations. Although it has some areas that required urgent hygienic attention. Naturally, most cities are always over populated, people from rural areas would always migrate to the urban areas for better livelihood either in search for jobs, resettlements, medical treatments, schooling/training, businesses, or visiting their relations and loved ones.

All these are possible when man is able to function as a living being. And since a living being in form of man this time around, cannot do without eating food and drinking water to acquire energy to do his work and later released the waste in form of urine and excreta to enable him lived longer, then proper consideration should be given to effective sanitation of the environment he lives as per how those wastes are to be disposed.

The operational method of carrying out sanitation which is cleanliness should be easily affordable and be maintain-able by all for societies to be free of hazardous diseases.

Open Defecation Free was not sighted in the areas visited at Hyderabad, but traces of excreta was seen along the road that links Abids and king kothi road. This act is common even in my country and the city where I live, despite government environmental ministries and some private sectors efforts in building mobile toilets around the cities. That shows sanitation problems is becoming universal.

Observation

from my little studies and travelling experience, I have observed that the major cause of societal improper sanitation in underdeveloped and developing countries in particular is owing to lack of education and adequate exposure, a lot of people don't see anything bad in open defecation especially those living in rural areas consequently polluting their available surface water which they use for domestic purposes, in some cities common in Africa some rented apartments don't have toilet facilities and yet their house owners care less about it, this would not have been like that if everyone had good education and adequate exposure.

Recommendation

It is recommended that there must be public health workers who should have proper training and be able to communicate in the language that all can understand especially the non educated people all over the world to know the importance of proper sanitation

Theme

Ecological Sanitation

Role of SCOPE towards Ecological Sanitation in Rural areas

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Water and Sanitation are so interlinked for hygienic and healthy life that in recent years there has been increased emphasis on creating awareness among public of the critical role they play in improving the quality of life of the community. Total sanitation campaign has been the main plank of the government of India since 1998 in promoting sanitation facility by giving an incentive of Rs. 1200 for the construction of toilets. The recent decision to increase the incentive from Rs. 1200 to Rs. 2200 for construction of twin pit latrines is a step in the right direction and would motivate the public further to build toilets in their homes, on the march to achieve MDG. Ecological sanitation is a new technology, by which the human wastes (faeces, urine and wash water) are collected separately in the specially designed urine diversion toilet, and the three are prevented from getting into contact with soil and water. The faeces is converted into good soil conditioner within the chamber itself, and the urine and wash water are filtered and used for raising kitchen garden near the toilet (onsite) or for raising crops in the farm (off site).

Since water needed for urine diversion toilet is very less, compared to other models of toilets like pit latrine, septic tank and underground drainage system, the ECOSAN toilet helps to protect the critical input for life, namely water. The ECOSAN helps us to shift disposal of human waste from the water cycle to the nutrient cycle. It also helps to promote social equity, as no longer sanitary staff will be needed to remove the faeces, a practice considered below human dignity for centuries. The faeces will become perfect soil conditioner in nine months without any foul smell or dangerous bacteria like ecoli or salmonella. The householder himself can take the compost from the chamber and use the same in the kitchen garden or sell it off to farmers. Being a new concept, ECOSAN needs intensive and new IEC techniques on usage practices, operation and maintenance and usage of sanitized products for agriculture.

The sanitized products, urine and faeces help in increasing farm production and ensure food security. They are environmentally sustainable since they come from organic matter, namely human waste. SCOPE (Society for Community Organisation and Peoples Education) has constructed 1200 ECOSAN

"Cost Effective Sustainable Sanitation - An Indian Experience"

toilets in Tamilnadu. It has imparted training in ECOSAN toilet construction for masons in 8 States of India with the support of UNICEF, Plan International and FINISH.

To start with 18 ECOSAN toilets were constructed in Kaliyapalayam village under the guidance of UNICEF in 2002. Then 246 toilets were constructed in Sevanthilingapuram making it a 100% toilet coverage village. 300 ECOSAN house hold and 3 ECOSAN community compost toilets (presently used by more than 350 persons daily) were constructed in Musiri. Specially designed toilets for aged people and child friendly toilets were also constructed. Sanitary napkin incinerators were also constructed for adolescent girls in community as well as school toilets. In one of the ECCTs 'use the toilet and get paid' concept is introduced to motivate the people to understand the value of urine and compost. 250 ECOSAN toilets were constructed in the Tsunami hit village of Kameshwaram in Nagai District. A 'Toilet Beauty Contest' (first of its kind in the world) was arranged. Cash awards were given for best maintained toilets and kitchen gardens.

Paddy crop raised applying urine as a liquid fertilizer was harvested two times in Musiri by SCOPE as a research project with the assistance of Tamilnadu Agriculture University of Coimbatore funded by WASTE, Netherlands.

Banana research is going on with the assistance of National Research Centre for Banana, Trichy with funding support of UNICEF-SEI, New Delhi and the first crop was harvested and the results are encouraging. It is worth mentioning here that a banana plant needs 50 litres of urine in 5 doses.

New Design: Based on the feed back of the users and on its own observations SCOPE designed a new model FRP Pan which makes maintenance and repair easy and simple. Urine diversion dehydration toilet complexes for schools have been designed and constructed in 10 schools with the support of UNICEF and WTO Singapore. It is expected that awareness on ecological sanitation will be propagated from the children to other children and parents.

So far 350 compost chambers have been opened and tested in the laboratory. It is found that there is no ecoli and salmonella. The compost is being used raise kitchen garden and applied in agricultural fields. To create awareness about the hygienic way of sanitation SCOPE arranged many rallies and interaction sessions with the school students on the eve of HANDWASHING day. Presently many toilets are being constructed in schools and the students are given hygiene kits.

As a part of research programme SCOPE has introduced addition of urea in the compost chamber of ECOSAN toilet for the best and quick composting of the Fecal matter.

Lessons learnt:

1. It is easy to motivate those who defecate in the open to go in for ECOSAN toilets than those who use the conventional toilets.
2. If people do not switch over to ECOSAN the demand for water will be more resulting in acute water scarcity
3. By promoting ECOSAN toilets huge amount now spent on chemical fertilizers could be saved
4. Environment will be protected through ECOSAN.

SCOPE has a plan for installing a Urine Bank for collection of urine from all the household and community toilets, ad separate the nutrient from urine in the form of 'STRUVITE' (CRYSTAL) for better utilization for cultivation replacing chemical fertilizers. SCOPE got the Nirmal Gram Puraskar Award for its exemplary work in sanitation for the year 2006 from the then President of India Dr. A.P.J. Abdul Kalam.

ECOSAN Toilet In Hilly Terrain Lessons Learned

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The paper describes two experiences of MYRADA KVK - the dovetailing of Eco-san toilets in hilly terrain of Erode district with development initiatives related to integrated and organic farming and, the use of a revolving fund managed by SHG federations to finance members to build individual eco-san latrines in Tamil Nadu. As a lesson for development facilitators, Myrada KVK has experienced that sanitation as a component of overall development needs a strong base of local level institutions (SHGs, federations, farmers groups, youth groups, etc.) that can build the incentive structures that enable new attitudes to sanitation to emerge and sustain. The local level institutions provide the financial and social means for people to put newly learned knowledge and attitudes to concrete practice.

When the modalities of implementing a sanitation initiative is left to local level institutions to develop and put to work, their ownership of the process increases and they are better able to provide both incentives and effective disincentives that enables communities to embrace sanitation practices. Even in the case of introduction of radically new technologies like Eco-san, people are able to integrate the technology into a broader understanding of ecologically sound practices. Working through the Panchayat Raj Institutions are imperative in ensuring community wide acceptance of sanitation. However, facilitators should be skilled in conflict resolution, developing pressure from below (through the constructive engagement of CBOs like SHGs) and providing project management capabilities.

ECOSAN: An Innovative Approach to Sanitation

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The challenge of the Total Sanitation Campaign (TSC) is to provide installations that are based on sustainable criteria and ensure that services delivered are used in a continuous fashion so as to create open-defecation-free (ODF) communities in rural India. This presupposes that the incentives cater to the special conditions that prevail in selected part of India. Ecosystem-based sanitation systems are desirable and a prerequisite for service delivery in areas that are or have: high water table, flood prone, rocky ground conditions, deserts, lack access to water or at high altitudes.

This paper highlights an innovative sustainable approach to sanitation called ecological sanitation or productive sanitation systems that can be very well incorporated in to the national Total Sanitation campaign (TSC) programme so as to achieve the desired objectives of total coverage. This approach if implemented in right earnest will provide the much needed solution for the long term sustainability of created sanitation facilities and also link sanitation with agriculture by recycling the nutrients found in human excreta. Additionally, ecological sanitation or productive sanitation systems are a means to improve livelihoods by contributing - not only to human and environmental health - but also to food security and climate change adaptation and mitigation.

Slowly but definitely the ECOSAN movement is moving northwards with some exciting initial successes in the state of Tamilnadu. It is suitable for households, community as well as for schools in rural/urban/peri-urban and for all strata of society from poor to rich, young to old.

"Success Stories of Sustainable Sanitation Initiatives in India by ESF"

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Sanitation has been always neglected area at local, regional, national and international level. The recent statistics declared that India is the most populated open defecated country i.e. 660 million people in rural and urban do not have access to safe sanitation, besides most town, cities, mega cities in India face serious problem in providing adequate sanitation, sewer and waste water management systems, collectively producing more than 27,000 million liters of waste water per day.

The continuous declining of fresh water quantity and quality (from 3400 cu m/cap to 1967 cu m/cap over last 50 years) is a major cause of concern. It is also estimated that by 2025, India will be water stress country which may lead to conflict between three major users of water i.e. Agriculture, Industrial and Domestic. Thus innovative, decentralized, cost effective, environment friendly and energy efficient solution treating the waste as close to the source and reusing the same after proper treatment, there by taking care of environment is the need of an hour!

ECOSAN Services Foundation (ESF), Pune based non-profit organization felt that there is need of appropriate knowledge sharing on the concept. Hence ESF in cooperation with gtz, Germany and Seecon International Switzerland started to work in the field of capacity development along with pilot demo model to disseminate the knowledge of sustainable sanitation approach focusing to school to the future generations, there catching them young to make the open defecation free and livable cities in India.

ESF is working in the diversified sectors in rural, peri-urban and urban areas focusing to agriculture sector, schools, community, Eco-village project, sanitation plan for pilgrimage town and upcoming projects in local government bodies with participatory approach and cost effective sustainable sanitation solution.

Collection, Transportation, Storage & Utilization of Human Urine

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An average human being gives out 750 to 1000 ml. of urine per day. This comes to about 500 lit per day. Thus urine is one of the principal wastes of human origin.

Unlike feces, urine contains no or very few pathogens. On the other hand urine is a potent source of plant nutrients (on an average 15 to 19% N, 2.5 to 5% P, 3 to 4.5% K on dry wt basis) In India & China it had been a traditional practice to use human as well as bovine urine as fertilizer. The manure obtained from human urine is rightly called Hirakhad (Hira = Diamond) which is more precious than Sonkhad- the manure of feces (Sona = Gold) Today unfortunately this much valued source of organic manure is neglected & wasted.

Nirmal Gram Nirman Kendra has undertaken a project entitled "Experimentation on Utilization of Human Urine as fertilizers".

The broad objectives of the project were,

1. To determine the efficacy of human urine as fertilizer &
2. To evolve methods for collection, transportation, storage & utilization of human urine

This paper highlights the outcome of the second objective of the project. Although it is known that human urine has fertilizer value, it is not being utilized on large scale. The obvious reason behind this is the psychological repugnance towards urine. This is mainly because of

- i) Foul odour
- ii) Decomposition on storage &
- iii) A universally accepted fact that anything given out of human body is untouchable.

If these hurdles are overcome, there could be a revolutionary change in the utilization of human urine. With this view in mind following experiments were carried out at NGNK to evolve simple, low cost yet effective techniques for harnessing the source of human urine from public places.

- a) Techniques for Collection of human urine
- b) Transportation of urine
- c) Storage of Human Urine
- d) Avoidance of foul odour & decomposition.
- e) Blending of organic substances with urine

Human urine is a potent source of organic fertilizer which is being wasted today. Similarly mismanagement of urine invites many consequences such as unhygienic surroundings, foul odour, disease-prone environment etc. Evolving techniques for hygienic collection, storage & utilization of human urine can solve the above problems & at the same time this potent source can replace the harmful synthetic fertilizers to some extent. Collection & utilization of human urine can be a source of employment in rural as well as urban areas.

ECOSAN For Developing Countries

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The decisions in various world summit for sustainable development, along with improvement of livelihood for people and also restoring the degraded environment, is a great opportunity for us. Out of eight goals identified in million developments goals, "ensuring environmental sustainability" certainly gives due importance to water supply, health, and sanitation. Obviously, meeting such requirements of sustainability would mean, cost effective along with new attitudes and appropriate technology especially in the field of sanitation.

The world health organizations define safe and improved sanitation as connection to public sewer, septic tank system, flush latrine, pit latrine etc. However, there are at least 260 cores people in the world, mostly residing in rural Asia and Africa, who do not have access to improved sanitation. In fact, pit latrine pose problem to groundwater and sewerage leads to discharge in the environment, with little availing of nutrient and both can not be called as effective and sustainable sanitation technology, thus questioning the sustainable sanitation. Has conventional sanitation system really given the sustainable sanitation?

The presentation will discuss the sewage conveyance treatment and disposal, philosophy of ecological sanitation, management of gray water, yellow water and black water utilization of nutrients, present status in developing countries and Indian scenario for sanitation. The suggestions for peri urban, urban & rural India will also be covered. After drawing, few conclusions and informing a case study near Mumbai, specific recommendation for developing countries will be covered.

Nutrient recycling in productive sanitation systems: considerable opportunities around the world

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Keywords: diversified drivers for sanitation installations, linkage agriculture-sanitation, partnerships, small scale business opportunities, local ownership, food security

Ecological sanitation systems have a strong potential for being sustainable, if technical, institutional, social and economical aspects are appropriately attended to. Ecological sanitation systems safely recycle excreta and other organic rest products for crop or biomass production. The statement 'safely recycle' includes hygienic, microbial and chemical aspects. The recycled human excreta, in solid and liquid form, and other organic rest products shall be of high quality both concerning pathogens and hazardous chemical components. Thus, the product should not pose any significant health threat or negative environmental impact when used. The definitions have been elaborated on by SuSanA (the Sustainable Sanitation Alliance) and the ECOSANRes Programme.

The concept of productive sanitation is frequently used synonymously with ecological sanitation. We probably need to revise the assumption that they are the same if we start focusing on Productive Sanitation Systems (PSS). The notion of PSS revises the emphasis that sanitation service delivery handles human excreta for protection of human and environmental health to an accentuation on the safe reuse of organics in agricultural production. The entry point is diversified from sanitation service provision towards food security as a justification for sanitation installations. Thus, the "triggering", of the community is based on safe and sustainable livelihoods by recycling nutrients rather than the focus on human health.

Leadership in the development and promotion of PSS has been provided by the International Fund for Agricultural Development (IFAD). By granting funds for the testing of urine as a fertiliser in agricultural production for improved livelihoods, in collaboration with CREPA (Centre Régional pour l'Eau Potable et l'Assainissement à faible coût) and the Government of Niger and SEI, have run a project in rural the African country Niger. Additionally, testing of PSS is in progress within IFAD-financed livelihood projects in Madagascar, Uganda, Rwanda, Mauritania and in India. In the latter case it is within a tribal empowerment project in the State of Orissa, the OTELP project with multi-donor funding.

The testing of PSS in Niger and elsewhere, including India, points towards a new way of motivating communities to desire sanitation services. A stronger driver to motivate individuals and communities than human health appears to be the possibility to increase food production by safely recycling human excreta. To paraphrase Kamal Kar's words in Community-Led Total Sanitation, agricultural productivity appears to "ignite a change in the community" in a way that is more potent than when arguing for

better human health. The fact that health is not the foremost driver to opt for sanitation installations have been documented in a study from Nepal, where dignity and privacy was favoured drivers.

To reformulate the entry point for sanitation installations by focussing on improved agricultural production as a driver, communities appear to be more readily accepting to move away from open defecation behaviour.

When opting for PSS we need exploration of the prerequisites for successful implementation. Further attention is to be given to how farmers' demands for PSS are responded to in order to ensure that appropriate support from experts and government is provided. In order to increase success, we need to explore, fine-tune and inter-link a set of complex issues that include the following, namely:

- careful selection of lead institution
- creation of partnerships prior to interventions
- dynamics of community decision-making processes in the initial stage when introducing PSS
- formulation and communication of the driver to trigger individuals, households, communities, government and experts
- gauging the beneficiaries contribution to ensure ownership
- micro-financing mechanisms
- promotion of small-scale business opportunities
- monitoring and post-implementation evaluations tools for enhanced community support to ensure behavioural change and creation of open defecation-free communities
- identification of competent actors for scaling up and support to policy amendments
- attitudes
- appropriate urine application methods to reduce ammonia losses, especially in rice paddies
- safety aspects in handling of faeces
- PSS as alternative to clandestine use of raw sewage water as fertiliser and source of irrigation

In addition to a better understanding of the mechanisms for introducing and implementing PSS, we need to ensure an enabling environment. Policy and regulations at all levels need to be amended accordingly to ensure desired development. The strengthening of institutions and capacity development of staff and other stakeholders and their inter-linkage need to be explored in order to ensure success and potential access to enhanced funding. N.B. funding in this context is not necessarily equal to subsidies. A PSS is like a "piggy bank" and should provide a return after a few years.

In conclusion, PSS should probably be seen in a wider context of water harvesting, conservation agriculture, composting of organics and possibly drip irrigation systems in order to make communities more resilient in face of growing environmental threats, especially climate change. With a PSS perspective we can hope for mainstreaming of sanitation - with a view to achieve MDG 7 and Target 10 in the development process.

Theme

Solid and Liquid Waste Management

Integrated Solid Waste Management in Kerala: Regional Approach towards Cost Effective and Sustainable Service Delivery

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One of the key sanitation challenges for India, on account of rapid urbanization and changing consumption pattern is the phenomenal increase/change in quantity, character and composition of solid waste generated, leading to serious pollution of environment and dwindling fresh water resources. With high density of population, Kerala is a city in the making in rural-urban continuum. Scarcity of large parcels of land, heavy rainfall and high water table are unique features that require non conventional approaches in designing sanitation options that are practical, cost effective and sustainable.

Analysis of waste disposal practices in Kerala reveal that, despite very high household sanitation coverage, environmental sanitation is very low. Though the municipal solid waste is not disposed off scientifically, the associated costs are phenomenally high. Had there been scientific approaches followed, waste can be processed and disposed of scientifically without serious damage to environment at costs much below the existing rates. In the area of solid waste, scientific management alone can bring in better and sustainable outcomes, with substantial cost savings.

As a result of the high consumption pattern, per capita waste generated is about 1000 grams per day on an average in cities and the uncollected waste in urban local bodies alone is estimated at 9 lakh MT. The situation is similar for Grama Panchayats as well, causing serious direct burden on public health and environmental safety. The overall compliance standard in Kerala is much below national average. Studies have shown that about 80% of the open wells are under bacteriological contamination which is major source of drinking water for households. Despite its advances in many health indices, the State is one having high morbidity low mortality syndrome.

In the absence of having individual scientific landfills for each local body (which is uneconomic even if possible), and as there are conflicts in almost every dumping site, the paper has examined the feasibility of regional approach. Estimates have shown that, Regional Engineered Land Fills (RELFS),

are cost effective and efficient with the advantages of scale economies. It also facilitates Integrated Solid Waste Management (ISWM), as an attractive investment proposition as well. After considering all key site selection parameters, the study has suggested grouping Kerala into six regions and identified one engineered land fill for each region using GIS tools. The paper has also suggested a menu of options like federated institutional architecture, cost sharing, PPPs, incentives for participation, cost recovery through tipping fees and door to door collection, to ensure institutional, financial, legal, developmental and environmental sustainability. The study concluded that, the area requirements for landfills in Kerala can be reduced to 957 ha for RELFs from 2316 ha in case of individual landfills, saving on land costs alone will be to the tune of 754 - 950 crores and operational costs per tonne reduced from Rs. 555 to Rs. 388. The paper suggests that decentralized composting and RELFs as a viable and practical option for a state like Kerala that can also significantly reduce the not-in-my backyard (NIMBY) syndrome.

Re-inventing the water cycle - Decentralized water treatment the OS1 way

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Incredible India - The rapid growth of economy has got India world-wide recognition. We are poised to overtake our one-time colonizers in the next 5 years, and grow up to become the 5th largest economy in the world. But examine the underbelly of this growing economy; you will see heaps of garbage, choked sewers, overflowing drains, dying rivers, and infrastructure failing to catch up with the unprecedented growth.

Have we forgotten to plan for managing our OWN WASTE? Let's take our rivers for example; majority of the pollution in the rivers is caused by untreated sewage that is generated by each one of us. According to the new CPCB report, India has treatment capacity to treat only 30% of the sewage generated. And that is not all, more than half the existing treatment plants are being under-utilized as either parts of the city are not connected to the plant, or the existing sewers are choked or the recurring costs are too high (electricity, chemicals, labor etc). The treated water is not being utilized due to high costs of transporting it to the end users, and ends up in drains and rivers containing 70% untreated sewage. This leads us to the question -whether like the sewage, is it money also down the drain?

What is the need of the hour - Is it conventional thought or do we need innovation in the policy making to change the waste management blue print?

This article demonstrates the success of decentralized systems and highlights the need of making waste water treatment more location-centric by using the 'local sourcing, recycling and re-using water' approach. The paper studies certain initiatives which are based on natural fermentation by microorganisms to treat household and urban effluents.

We need to rethink the way we treat this crucial water cycle, we need to innovate in developing strategies to economically and efficiently deliver the sewage from source and redeliver treated water back to users. There is a need for creating awareness about such innovative approaches to be able to scale up and improvise.

Decentralized Waste Management applying concept "Waste to Resource" - An overview of community initiatives in Solid and liquid wastes sector

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Key words: DEWATS systems, DESWAM practices, "waste to resource", bio-remediation.

This paper demonstrates that the use of decentralized systems such as DEWATS (Decentralized Wastewater Treatment Systems) approach to wastewater treatment and DESWAM (Decentralized Solid Waste Management Systems) have had more success and there is a need to make waste-management people-centric and effective through the "waste to resource"- approach.

The case study explores a few initiatives implemented which uses natural methods DEWATS for use as Sewage Treatment Plants (STPs) and DESWAM practices for household, urban and rural wastes both in liquid and solid form respectively.

These decentralized initiatives have succeeded after broad issues of funding were taken into consideration. There is a need for capacity building of communities, institutions and participation by rural bodies in order to become aware, scale up and improvise these innovative approaches in the future at both urban and rural centers .

For propagation of the "waste to resource"- concept, successful models, have been utilized for showcasing the principles and explaining the practices. Communities when becoming aware of all the aspects, become more confident to implement more such systems and deriving benefit from these decentralized initiatives.

Building Capacities for up-scaling decentralised sanitation solutions

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Key words: Capacity building, decentralised, sanitation, training, target groups, basic needs services, knowledge, skill, logical methodology.

India is home to almost one-third of the world's population that survive without adequate sanitation facilities. Bremen Overseas Research and Development Association (BORDA) in collaboration with the Consortium for DEWATS Dissemination (CDD) Society, has developed for the last 10 years, integrated solution packages for the provision of basic urban sanitation facilities. The customised packages include all or part of key sanitation elements like: toilets, decentralised wastewater treatment systems (DEWATS), health and hygiene education, solid waste management, drainage system, stakeholder participation measures.

Over the last decade, with the support of its network partners CDD Society has been successful in delivering around 400 sanitation systems in South Asia. Due to the rapid growth of its population, India may require 1.3 million sanitation systems alone in the coming years. One of the key issues in meeting this huge target is the lack of trained professionals and implementing agencies.

To upscale the efforts in delivering basic needs services in the sanitation sector, the Basic Needs Services (BNS) Network has started the establishment of a capacity building institution for decentralised sanitation solutions called Centre for Advanced Sanitation Solutions (CASS). CASS aims at providing the entire range of knowledge and skills required for the implementation of integrated sanitation solutions such as technical know-how for designing toilets, decentralised wastewater treatment systems (DEWATS), drainage systems, solid waste management and drinking water source protection; social support measures include health and hygiene education, community-based participatory planning tools as well as project management related aspects. For town and city managers, CASS will offer planning support for city and town-wide sanitation programmes. Furthermore, sanitation related R&D activities, knowledge management and exhibition is offered under CASS's 'One-Stop-Shop' concept; all components of sanitation are provided under one roof.

This paper presents the basic components of the capacity building strategy developed by CDD/BORDA focusing on target groups, development of knowledge units (training module) and the didactical approach.

Ecological Water Treatment and Sanitation in Crisis Situation

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Key words: Ecological water treatment, eco-sanitation, crisis management, bio-sanitizer, eco-chip

Conventional techniques, mostly using chemical approach for water treatment and sanitation/health, get overwhelmed during crisis situations such as cyclones, floods, earthquakes, fires, epidemics and terrorist attacks.

This paper presents the root cause of these natural and man-made calamities and also develops ecological approach to water treatment, sanitation and health.

This view evolved out of 36 years of research at Bhawalkar Ecological Research Institute (BERI), Pune in active 'collaboration with nature'. We can learn a lot from 4.6 billion years of evolutionary experience of nature on the earth. Life evolved from highest pollution to gradually reducing pollution. Man is the latest arrival on the earth and can tolerate very low band of pollution.

Land plants provide us with mechanisms that can help us convert 'pollution into resources'. Odor, pathogens, pests and other unpleasant acts of nature are indicators of spillage of resources by man. This is the basis of ecological techniques of water treatment, sanitation and crisis management. Use of BIOSANITIZER Eco-chips makes this simple, sustainable and cost-effective. The paper also presents a case study of water treatment, sanitation and health management in a flood situation, such as that during Mumbai deluge of July 26, 2005.

Safe Drinking Water Availability to People on Globe: Future Challenges

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Key words: Safe drinking water, Contamination, viable technology

Safe drinking water availability to all people on globe is a major problem and challenge before world community. Ground water is becoming contaminated due to industrial effluents and others because water systems (surface & ground water are inter-connected and one system has impact on another directly or indirectly). Lack of safe drinking water is a major cause of illness and mortality, as a result of exposure to infectious agents, chemical pollutants, and poor hygiene. Inadequate access to water in the home is also a source of economic disadvantage by requiring large commitment of human resources to fetching and carrying water. Sewage composed of domestic wastewater and/or industrial discharge, is a major source of water pollution in India, particularly in and around large urban centres. This is because, the sewage is largely let out untreated and it either sinks into the ground as a potential pollutant of ground water or is discharged into the natural drainage system causing pollution of rivers/streams in downstream areas. While about 78% of the urban population have access to safe drinking water, only about 38% of the urban population have access to sanitation services that affects safe drinking water availability. Many effective and viable treatment methods for contaminated water, development of water conservation system using effective techniques like remote sensing techniques and applications in selection of more suitable areas (based on hydromorphogeology, vegetation pattern, drainage pattern, slope, lineament density and soil texture and other properties in the study area) for making check dams along drainage pattern to recharge ground water, education and intervention through community interaction to change human behaviour towards better water management strategies etc are some of the key issues to improve the situation for drinking water resources.

Sustainable Decentralized Wastewater Treatment Options

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Proper treatment of sewage in urban areas has been a major challenge in India and other developing countries. Sanitation coverage of a town, most of the time is a misnomer as it does not include treatment of wastewater- a major component of sanitation. The MDG on sanitation can't be achieved merely through construction of toilets, rather effective management of waste water through affordable technologies. In India hardly 5% of the towns / cities have sewage treatment facility, that too partial. It is an unaffordable task for the local governments/bodies to provide conventional sewerage treatment system due to the fact that available technology has prohibitive operational & maintenance costs. Further, sludge generated from such system contains heavy metals and other toxic compounds whose negative synergistic effect is insidious to soil and environment when used as field application.

Decentralized waste water treatment is the only affordable method to overcome the problem of waste water management in developing countries. There are several technologies for decentralized treatment that can be used as per the site conditions. It requires much less operation and maintenance costs; semi skilled persons can operate whole system; depending upon technology there is economic return out of the system.

Anaerobic baffled reaction tanks system developed by BORDA in collaboration with Sulabh is being implemented in different states in India with slight modification as per the site conditions. One of the technical problems experienced with the system is desludging of the treatment chambers as they contain cinders / stones. Further, under anaerobic condition, population density of bacteria is higher in the above middle layer, i.e., fermentation zone. Therefore such media at lower portion of the tank are less effective. Loose and thick ropes of coir can be used for bacterial growth medium inside treatment chamber. It is a much better bacterial growth medium and can be placed at desired depth in the chamber. The system makes desludging of the chambers easier, as the coir ropes are easily taken out of the chamber without affecting the operation of the system. Since lignin content in coir is very high, it remains unaffected in waste water for longer time.

For areas having electric power supply, a simple device for bottom aeration at multiple points in the chamber through air pump has been developed. Such pumps having low flow rate, consumes only 55 to 75 watt electricity depending on capacity of the pump, is operated almost 20 hours a day. At a hydraulic retention time of about two and half days only, the effluent quality is much better. Its BOD is less than 10 mg/l without any odour and colour. However, in both the cases, number of faecal coliform in effluent is much higher as there is no provision in the system to kill such pathogens.

To overcome the challenges of safe reuse of effluent of biogas plant linked with public toilet, a sustainable and simple technology for its on-site treatment has been developed. In addition to the generation and utilization of biogas for different purposes, the effluent is treated through the technology named as SET (Sulabh Effluent Treatment) that comprises one over-head settling tank where effluent of biogas plant is allowed to settle for half an hour. From this tank effluent passes through sand filter followed by one aeration tank containing bacterial growth medium of coir. From this tank effluent passes through activated carbon filter tank and finally through ultraviolet chamber where UV exposure time is maintained at around 4 minutes. Final effluent is colourless, odourless and completely free from any pathogen, having Biochemical Oxygen Demand less than 1 mg/. It is absolutely safe to use it for agriculture purposes or discharge in any water body without causing any health or environmental risk. The whole system is operated through caretaker of the public toilet complex and maintenance cost is born out of the amount received from users' contribution of the toilet complex.

Sustainable Wastewater Treatment Technologies For Urban India

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India is growing rapidly with fast track urbanization. Within a span of 50 years of Independence, the country's urban population has expanded almost five times. By 2025 about 50% of the population in the country would be urban dwellers thereby putting a tremendous stress on the environment particularly on basic amenities like water supply and sanitation. Proper wastewater management calls

for a system where wastewater is regarded as a resource which can be recycled and reused. Sustainable wastewater management includes many components like environmental, technical and socio-cultural factors but economy of scale is the most important determinant of sustainable practices in developing countries. Onsite wastewater treatment is gaining much popularity as it can treat wastewater without large scale, energy intensive mechanical equipments. Recycling and reuse of wastewater at local level can significantly reduce the stress on fresh water sources and therefore can become an ecologically and economically sustainable system. Decentralized wastewater treatment is an approach rather than a packaged technology. It combines a set of simple technologies like baffled reactor, reed bed and oxidation ponds put together in different combinations as per requirement. This paper describes the importance of such small scale onsite treatment systems supported with different case studies.

Theme

School Sanitation

School Sanitation and Hygiene Education Scaling up with Quality and Convergence

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Key Words: School Sanitation, Rural Sanitation, Hygiene Education

School is important for cognitive, creative and social development of children. So is the School Sanitation and Hygiene Education (SSHE) necessary for the safe, secure and healthy environment for children to learn better and face the challenges of future life. Provision of sanitation, safe drinking water facilities & personal health and hygiene education is the key to improved health, learning ability, attendance rate and low dropout rate of children.

School Sanitation and Hygiene Education Programme (SSHE) because of its in-built capacity to ensure generational change and serving as an entry point for improving sanitation and hygiene within the family and community, therefore has been accorded top priority under Total Sanitation Campaign (TSC) being implemented by the Department of Drinking Water supply, Ministry of Rural Development to make an open defecation free rural India by creating a demand for sanitation facilities.

School sanitation and hygiene Education as one of the key components of TSC aims to ensure children's right to safe, hygienic and child friendly learning environment by providing sanitation infrastructure in Government schools in rural areas, coupled with hygiene education imparted by trained and capable teachers. With concerted efforts by the States the school sanitation coverage has increased significantly and stands at 76% in the current year with some of the of the States like Sikkim, Mizoram, Pondicherry, Maharashtra, Karnataka, making the remarkable achievement of cent percent school sanitation coverage. The Government of India has committed to cover all rural Government Schools with sanitation facilities by 2011.

School sanitation, earlier mainly restricted to construction of toilets has now expanded in many States to include intensive communication activities and capacity building of teachers, students and village education committees on use, maintenance, personal and environmental hygiene education,

"Cost Effective Sustainable Sanitation - An Indian Experience"

developing child and gender friendly school toilet designs, ensuring proper water supply for cleaning and handwashing by use of forcelifit handpumps, rain water harvesting structures. These reforms have created renewed interest which provides a great opportunity to scaling up school sanitation programme in all schools with effective integration and convergence with other key programmes like Sarva Shiksha Abhiyan, Ministry of Human Resource, translating into concrete plan of action.

School sanitation and hygiene education programmes need to be operational through the country to reach to a large number of school children, particularly girls, and their families.

This paper addresses the key achievements of SSHE programme, a few critical issues for scaling up while retaining the quality of the programme: a great challenge given the currently available institutional support, capacity and skills.

Usage study carried out in Family, Community and School sanitary blocks

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1. Introduction and Justification: There is a lack of systematic follow-up on the usage or effectiveness of the sanitary latrines built. When we think of sustainability; the maintenance and management of the facilities plays a major role. Be it a community toilets or school toilets unless they are maintained well and kept clean with no stinking smell; no one will be willing to use them and become a structure without any use. It is observed that changing of habit among the rural community from open defecation to use of toilet need education and awareness in relation to health and economy. If the technology used is not a suitable one for that particular area and also not properly maintained; those who started using the facility stop using it leaving it unattended. Especially when people need to understand the benefits and advantages of ECOSAN toilets compared to flush toilets; pre and post project support is vital. ECOSAN offers a solution to sustainable sanitation provision as it aims at providing improved sanitation by sanitizing the excreta and re-using it in agriculture.

2. Study Area and Methodology: Wherever the Need India Services working in partnership with local NGOs and helped in building more than 1,500 family ECOSAN toilets, two community ECOSAN toilets with bathing and washing facility and number of school toilets with adequate urinals more focuses on the community in Cuddalore district of Tamilnadu; and have undertaken model ECOSAN projects in Maharashtra, Gujarat and Andhra Pradesh. Present study carried out was a follow up of a study carried out two years back; mainly to understand the sustainability of the common facilities provided as community toilets and school toilets, where as in the family toilets, it is to understand the usage level. Though the study was planned to cover 100 % of the toilets built in fourteen locations, out of 920 families provided with toilets we could get the survey done in 817 families. Some families have deliberately removed the toilets to construct new house (especially in the tsunami affected villages where new housing constructions were undertaken by government and other agencies) and a few of the families were not present to get the survey done. A detailed questioner was used in the survey along with observing the usage of the toilets and hygiene behaviour; and also followed the usage of the urine and manure in the fields.

3. Results and Discussions: The staff support provided helped in continuous interaction and educating the community in proper use of the toilets built. The usage is slightly low in those villages

where fewer visits by the staff is noticed. Follow up after the construction is also a key in getting more usage until the first chamber opened and used in the fields.

Covering the school children with necessary facilities helps in quicker increase in usage and better maintenance. More demand have come from the families whose children are in such school with facilities. The maintenance committee formed in the schools are very active and managing the facilities well. The user fee collected from every child and also from the teachers are well accounted and used in maintenance of the block. The collected money is deposited either in the local post office or bank and operating it along with a teacher responsible. The waste water is used in vegetable gardening and the yields are sold back to the school kitchen or anyone who is interested.

Similar to the school maintenance committee, the committee looking after the community toilet blocks functioning very well. There is tremendous increase in number of users. The user fee collected from every family around the facility is used for paying for the person who keeps the facility clean and tidy, electricity charges and also for water. The wash and bathing water is treated and recycled to raise banana garden around the facility which adds to the income for the maintenance funds. Though there are more demand for such facilities in the nearby locations, we could not do it for want of common land. This lead to consider making a mobile unit, which is now, caters to more than 100 families in the densely populated areas of the harbor in Cuddalore.

School WES facilities in India - a lot to do

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Key Words: School WES, participatory process, sanitary block, Child-friendly design, children, hand-washing, school WES audit.

Good water, sanitation and hygiene in schools is critical for children's development. When schools have a safe and adequate water supply and good sanitary facilities children have a healthier physical environment; and more girls stay in school into the higher classes (and reduce absenteeism amongst female teachers). Constant use of sanitation facilities is well linked with availability of sufficient water.

A participatory audit of 2,442 schools in 10 states conducted by Plan India highlighted serious gaps in water and environmental sanitation (WES) systems, water and environmental sanitation budgetary provision and children's hygiene practices. Interestingly schools with acute problems either had acute water supply issues or serious sanitation problems, but very few schools had both. While there were great differences between states and between schools in states, there is clearly a need for all stakeholders to work together to create well maintained and child friendly systems and effective behavioural change in hygiene and hand-washing.

This paper highlights some of the key measures that need to be taken for the improvement and implementation of school water and sanitation services to achieve quality education and reduce absenteeism / drop outs especially girl children. The paper also describes the approach taken with the audit and shows how effectively children and teachers can participate in such studies. In this case 167,000 children were involved with their teachers helping the validation processes.

Rural School: A Healthy Place to Learn? An Assessment of School Sanitation in Rural India

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In rural India, as most of the children are first time toilet users, school should be a role model for learning hygiene. Conversely, many rural schools have poor sanitation facilities. This in turn is responsible for absenteeism and large-scale dropout rates in school. Many psychological studies revealed that a human mind can be well moulded below 14 years of age. The unhygienic school environment makes negative impact on children due to which the problem is further carried on to next generations. Achieving attitudinal transformation among rural students can also turn them as effective agents to bring change in the mindset of their families and communities. Though prime importance is given to the issue by the government, there are lots of setbacks still in its implementation. The term 'sanitation', though mostly is used for toilet facilities, there are other amenities and issues that influence the health dynamics in school; facilities and concerns surrounding drinking water, mid-day meal, absence of compound wall, along with the attitude of various stakeholders. The reasons for lack of hygiene in schools are many. Poor sanitation in rural schools is mainly illustrated by scarcity of funds, lack of commitment in implementation and the ignorance of rural children. Increasing the capacities at multiple levels may ensure delivery of positive results. There are schools, which effectively utilized the abilities and resources already in existence and have set as examples to others. They certainly have promising lessons for the rest.

"WASH Promotion in Schools-Addressing the water and Sanitation needs of Children in Schools - Issues, Means and Methods"

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Key Words: WASH Water sanitation and hygiene Promotion, PTA Parent Teacher Associations, school curriculum, gender needs.

After the home and family, the schools and teachers play a pivotal role not only in the child's cognitive development, but more importantly in the health development of the child. It is also a socializing institution that stimulates learning environment and positive changes. Therefore healthy learning can be triggered only in healthy learning environment and practices. Poor sanitation, water and hygiene have many serious repercussions in children - and particularly girls - which hamper their right to education because their schools lack private and decent sanitation facilities. Schools generally lack the necessary facilities of Water, Sanitation, and Hygiene practice education.

The necessary infrastructure facilities such as classrooms, seating facility, toilets, black boards etc. Apart from providing with the hardware, there is a need to complement it with necessary knowledge and skill development of the user groups. To further strengthen the efforts the focus is largely to make each component of the intervention functional, sustainable and collaborative.

Water sanitation issues in the schools around the country:

Due to the lack of water, sanitation menstrual hygiene facilities and lack of toilets for the disabled

students the problems and issues faced by students and teachers are many. There is need for more investment and efforts towards schools as an important institution for child development. It is also important to support both private and government schools in achieving the facilities. However the government schools or children institutions should be supported by hygiene promoting activities.

The components of school program that can make a difference are as follows:

1. Facilitation of water and sanitation in the school as these are basic needs for healthy and hygiene environment and practices.
2. Promoting Hygiene education and practices for behaviour change among teachers and students.
3. Building up mechanism for the operation and maintenance of the water sanitation facilities.
4. Educating community and teachers on their role in the school and their child's development by Parents Teacher Associations.
5. Community Involvement for ownership and sustainability, school as an extension to community development.
6. Integration of Hygiene Promotion Curriculum
7. Teachers Training

Strategies / Steps for water sanitation and hygiene promotion in schools

Situational analysis

- a. Technical Survey-Taking stock of the available water and sanitation facilities in the school and the gaps there in.
- b. Understanding the Knowledge, Aptitude and Practice level among the schools (teachers and students)

Making available the infrastructure and facilities for water and sanitation according to the standards

- Design and Plan: Design and plans of the facilities to be worked out with the government departments also taking into account the available local resources and wisdom. Identifying the low cost and technological innovation in models and getting the necessary clearance from the department.

Addressing gender needs and menstrual hygiene needs in schools

- Children to be made as agents of change
- Bringing children at the forefront for change through education and awareness programs for behaviour change.
- Promoting their involvement in maintenance through child cabinets and school committee.

Operations and Maintenance

- Regular health and Hygiene activities integration into the school curriculum such as monthly workshops on health & dental checkups, revisiting key hygiene messages.
- Providing training to the school management, children and community on the maintenance.
- Have a Memorandum of understanding with each of the school management committees - in order to have greater Involvement and ownership of the school committee in the

planning execution and maintenance of the infrastructure facilities. Identifying and linking the local skill base with the schools.

- Developing a sustainable system of school level fund mobilisation and fund flow- such as parking of funds for maintenance.
- School based monitoring system for coordination and learning
- Incorporating process documentation in the plan to capture the learning, progress, challenges and impact of the interventions

Resource Mobilisation and Collaboration

- Linkage with respect to capacity building, regular health awareness services, IEC materials and other technical know-how.
- Linking the regular government program to the schools
- Utilising the services of the local health workers and Anganwadi workers.

The envisaged impact through hygiene promotion in schools

Better health of the students (physical and psychological), better enrolment ,Retention and improved performance of the students, Reduction in diseases such as diarrhoea and worm infection, Reduction in drop out especially among girls, Result is provision of water sanitation facilities, and better drinking water facilities thereby affecting health, Development of operation and maintenance systems of the WASH facilities created, Awareness of water sanitation knowledge and practices among school children and their families.

Case studies of conditions in schools will be presented.

"Skill development for school drop outs through toilet construction"

P Purushothaman^a and Dr. E S M Suresh^b

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There is dire shortage of skilled man power in the country in construction industry. The unskilled workers in construction industry are about 82.45% of the total workers [1]. The country is having most young people in the world. The training capacity in the country catering to mason and other related trade is very small as compared to demand. Most of the youth do not prefer to work in construction sites as compared to working for IT Companies, so youth preference for taking construction related work is low. Hence, the paper attempts in attracting and providing short term training as induction cum motivational training for youth to choose construction related vocation. Thus availability of skilled workforce would be enhanced. This paper compares few available training programs, their syllabus and content. The proposed training attempts to provide a wholesome training and learning experience. After initial induction training, the trainees would receive training from experienced masons working at site similar to traditional method of apprenticeship training, with

continuous support and reinforcement from us or experts. This training program is a direct modification of experience gained through training of masons, supervisors and raw hands for tsunami relief works through Gandhigram Rural University, Dindugul. This training program is proposed to be implemented as an experiment to find out whether it is effective in meeting industrial and trainees' expectations.

Theme

Sanitation in Emergency Relief

Access for Water and Sanitation in Disability Rehabilitation - A Study in Rural Environment of Andhra Pradesh

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Keywords: Water Harvesting, Watershed Management, Disability, Rehabilitation, Water, Sanitation, Empowerment, Inclusion, Persons with Disabilities, Sustainability, Quality of Life.

Water and Sanitation (WAS) play significant role in the area of Disability Rehabilitation. The poor access for water in terms of its quantity and quality is the key factor in keeping people poor, unhealthy and further becomes barrier in improving their livelihoods. When this situation is complex with the normal people itself then its impact with the people with disabilities is far greater. Water is the additional factor to poverty, disability and development which are cause and consequences of each other. As a result, the access for water literally controls the health and development of the people as well as the area at all levels in general and particularly in the rural villages where the water storage bodies are less and ineffective.

The poor access for the water and sanitation affects the people in getting the disability and while under going the training and rehabilitation. In the disability area, better access for water and sanitation is necessary for the prevention of disability and to rehabilitate the people with disability effectively for better sustainability with quality of life. The present paper deals with the awareness created for the better use and management of water and sanitation facilities which is adopted as a module in the area of disability through community based approaches. Suitable measures and models adopted for the rainwater harvesting improved the access for water and thus for sanitation. This was done in the selected villages of Krishna and Guntur Districts of Andhra Pradesh. In addition, the training provided to stakeholders like: anganwadi workers, health workers, professionals, persons with disabilities and their parents / family members, service providers / NGOs / DPOs / CSO and community members yielded for attitudinal changes in understanding the need and gravity of the situation. The impact was positive and significant in the prevention of disabilities and rehabilitation of the people with disabilities. The module on water and sanitation in the curriculum of community based rehabilitation improved the capacities of the professionals to implement the same at grass root environment. In view

of the United Nations Convention on the Rights of the People with Disabilities (UNCRPD) and its obligation for the amendment of Indian Disability Acts and in the whole process of disability rehabilitation, access for water and sanitation is going to gain importance to work for the inclusion of persons with disabilities with right based approaches at all levels with better sustainability and quality of life.

The Challenges of Ecological Sanitation in Coastal South India - a Case Study

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Key words: composting, eco-san, defecation, urine-diverting

For millennia, Indians defecated in an eco-friendly manner in backyard pits, covering feces with earth which composted naturally. Indian scripture prohibited defecating in water and using river or lake water for anal washing. Today, however, raw sewage is discharged directly into rivers, lakes and ponds. Moreover, 70 percent of the people have no toilet, not even a pit, and must defecate in the open. For 8 years, Akash Ganga Trust, our organization, has taught sustainability through rainwater harvesting and protection of water sources from pollution through eco-friendly sanitation.

In Kovalam, a tsunami-hit coastal village near Chennai we have established a demonstration project to create awareness and a 'demand' for ecological sanitation. The village was selected because of our past work there and because its nine hamlets, representing different castes and religions, are a microcosm of greater India. Groundwater is close to the surface, clean, and a source for community wells. Now, 80 percent of the homes don't have toilets of any kind. People defecate in the bushes, near a river bank or on the beach. The village is too poor to construct a sewer system and pit toilets would pollute the groundwater.

We propose to discuss in this paper, our anxieties and thoughts on not only lack of sanitation facilities for a large majority of people in this country but also improper sanitation practices. We also wish to share our experiences to popularize, propagate and promote ecological sanitation in peri-urban and rural areas particularly the coastal villages of Tamil Nadu since 2005. We shall also discuss the economic, social and behavioral issues involved in the whole exercise.

Phaydemand shauchalay (Beneficial toilet aka Eco san) as a feasible and sustainable alternative option for the flood prone areas of north Bihar

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Inability to access hygienic and secure sanitation facilities during floods is one of the most severe problems confronted by people displaced to 'safe' locations during floods. With many people having to

live on embankments or trapped in elevated region under marooned conditions hinders access to sanitation. There are hardly any existing facilities that cater to the sanitation requirement of people during floods. Perforce, people during floods in the absence of hygienic and secure sanitation facilities adopt systems such as hanging toilets, tree toilets, terrace toilets, backyard open defecation, open common place defecation that are life threatening, unsafe, unhygienic and humiliating (more so for women and adolescent girls). On the other hand, during the non-flood season the sanitation facilities are a mix of conventional toilets, drop and collect toilet, toilet with bamboo and plastic septic tanks and largely open defecation. The present practices in a way are life threatening because of the shallow water table, water logged areas which gets contaminated easily in such circumstances. This is possibly one of the reasons for the presence of high levels of Escherichia coli (commonly abbreviated E. coli) in groundwater. People residing in floods prone areas have regularly fallen victim to diarrhea and gastro-intestinal problems leading to high morbidity and mortality especially amongst infants, women and the elderly. Declining nutritional intake coupled with unhygienic and unsafe living conditions takes its own toll.

Megh Pyne Abhiyan (MPA), literally clouds' water campaign, is at the same time a campaign, involving people around the issue of alternative water and sanitation facilities, and a functional network of grassroots organizations in five districts across north Bihar Supaul, Saharsa, Khagaria, Madhubani and North Bihar. The campaign has been working for past few years to develop localized sanitation facility propagated as Phaydemand Shauchalay (Beneficial toilet) to cater the sanitation needs of the people keeping in mind the geographical and ecological challenges of the region. The campaign has locally developed mobile and static phaydemand shauchalay (made out of local material and with the help of local perception and skill) varying in shape and design (with the intent of using the technology in diverse habitat and geographical layout) having the potential to address the sanitation problems encountered by the local habitants while living in two extreme climatic conditions.

"A Success story of Sustainable Rural Sanitation With community participation" - In Arattupuzha Grama Panchayat, Kerala

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Sanitation in general is the management of waste especially solid and liquid. In normal situation, community and development sector is mainly focusing on house hold sanitation with special thrust to human excreta management/disposal. In Kerala, coverage of toilets in houses and institutions are very high. Hence there is small pockets in hillocks (water scares area) and water logged area are still in poor coverage in sanitary toilets. The main reasons for this backwardness are absence of proper technology choice and affordability. If this is the one side of the coin, the other side (holistic approach of sanitation towards the waste management or sanitation in a wide spectrum) of Kerala is not much ahead compared to other states in India. In these circumstances, we tried to address sanitation in a comprehensive manner according to the concept of "seven pillars of sanitation" through Punarjani project in Arattupuzha.

Pillars	Reinforcement (Activities/ environment creation under Punarjani)
1. Personal hygiene	Awareness creation and capacity building

- | | |
|----------------------------|---|
| 2. Home sanitation | Awareness creation and motivation for liquid and solid waste management including infrastructure development |
| 3. Human excreta disposal | Construction of sanitary toilets new or redesign of existing one |
| 4. Handling of safe water | Orientation in usage and management of water including rain water harvesting and recharge through wells and ponds, construction and maintenance of wells |
| 5. Liquid waste management | Providing support in construction of soak pits, rejuvenation of stagnant pools, ponds, dead water storages and canals |
| 6. Solid waste management | Awareness creation and ensuring habitual change in collection and separation of waste at source and safe disposal (vermin composting, sanitary land filling and sanitary plastic mount) |
| 7. Environment hygiene | Rejuvenation and up keeping of traditional water sources, institutional hygiene, school sanitation ,market waste management, eco friendly coir fiber retting units etc.. |

Community participation is the key and inevitable factor of this success, cost effectiveness and sustainability. Because of the demand driven approach, the community own up the project and extended their full hearted support. More over they realized the necessity to address the sanitation and hygiene issues for the betterment of their environment, health and livelihood to the current and future generation. Grama panchayat, User Groups, Women Groups under the head of “Kudumbasree” and student’s wing under the title of “Balasabhas” are the major institutional forums for the management and up keeping of these components. Due to the effectiveness and success of the project, Government of France (Donor) is planning to scale up the project under bilateral agreement in future.

In short, we tried to cultivate a new behavioural approach towards sanitation in the mind set of the community in Arattupuzha.

How Household Water Treatment & Safe Storage Programs Are Emerging As A Hidden Success In Emergency Situations

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Promoting treatment of water at household level has been shown to be one of the most effective and affordable means of preventing waterborne disease in development and emergency settings. Household Water Treatment & Safe Storage programs (HWTS) are now being supported by major relief organizations and NGOs.

International development of the HWTS network has resulted in a secondary and significant benefit to vulnerable low-income groups. This benefit is perhaps not fully appreciated.

HWTS program development has seen the effect of crisis situations such as floods and earthquakes mitigated. This is due to both the deep pre-positioning of stocks of water purification products and

most importantly the pre-education of vulnerable communities by HWTS programs. Deep prepositioning in effect is making water purification products immediately available on an ongoing basis via local retail outlets and community based distributors, while the pre-education is the information and education programs & the availability of educational materials in local languages. The net result of this is that communities are able to self treat water and no longer need to await the interventions of emergency aid agencies which can take over two weeks to reach all survivors.

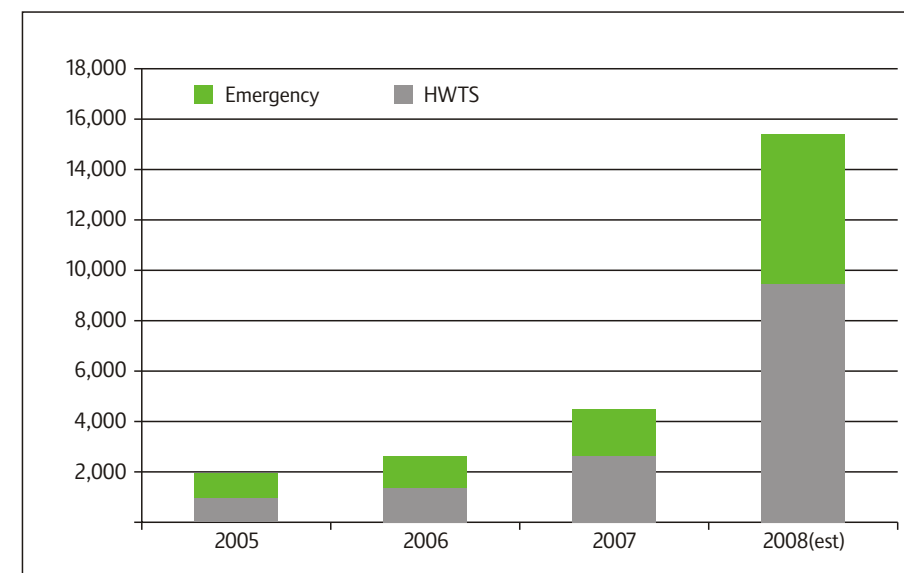
In 2008/9 some 1 billion Aquatabs have been used for routine treatment of water in the home and emergency situations. Three recent examples of where HWTS programs have made product immediately available in crisis situations have been, Haiti in January 10, Ethiopia in September 09 and Vietnam in October 09.

In Ethiopia, there were queues of people outside pharmacies to purchase Aquatabs as a result of a cholera outbreak. The communities understood the threat, understood the cure and were able to take immediate action to prevent further outbreak.

Over 60 million Aquatabs were shipped to Haiti within days of the earthquake while Aquatabs were also immediately available locally due to long-term sale through retail channels and ongoing promotional programs. These stocks were made available from Haiti itself, Dominican Republic, Panama, Mexico, Britain and Ireland due to pre-positioning plans arising from HWTS programs.

Graph below.

- An analysis of the increase of Aquatabs usage over the last few years bears out this point in highlighting the increased emergency usage and this increase usage can certainly be measured as lives saved.
- Water treated with Aquatabs in millions of liters. For year 2008 / 09 over 15 billion liters of water were treated with Aquatabs. The growth in HWTS usage is seeing a matching growth pattern in emergency usage.



- Note link to recent Haiti activity. <http://www.youtube.com/watch?v=MqOrQMYF6Oo>

- The unique features of the Aquatabs programs include,
- Unit dose (easy to understand).
- Acceptability (taste, cultural, religion)
- Consumer research lead communication techniques
- Affordability (1 2 Rupees per 10 litre or 20 litre tablet)
- Rapid commercial scale-up

Aquatabs are being promoted to low income, rural & vulnerable communities using social marketing behavioural change methods. The technology combines new learnings in communication techniques to non-literate peoples with affordability and appropriate product formulation.

The new developments in communication techniques arise from multi-country focus group work in rural and urban-slum settings while the affordability knowledge is developed from appropriate product benchmarking in minor kiosk shops and other end user point of purchase locations.

Various hybrid commercial models combining Public Programs, NGOs and normal retail channels see Aquatabs being sold continuously at affordable prices, approximately 1 2 Rupees for a 10 litre or 20 litre tablet.

These robust commercial channels assure the early scalability and long- term sustainability of supply to lowest income rural peoples and slum dwellers internationally.

Sanitation Still a challenge in Tsunami Hit areas

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Sustainable sanitation to ensure a dignified and safe life still haunts thousands of fishermen in the coastal belt of Tamil Nadu which was battered by the Killer waves in December 2004. In March 2009 Mr. C.V.Shankar in charge of Tsunami relief operations in Tamil Nadu admitted that they had not understood the magnitude of the sanitation problem in the coastal areas and it was still grappling with it. The social, cultural, geographical and technological challenges faced by the government and sanitation activists to change the mindset of open defecation forced to by the Tsunami families still remains and call for an integrated, time bound plan with adequate administrative and financial support.

The State and Union governments, Indian and International funding agencies NGOs, disaster management experts have never witnessed a catastrophe of this nature which within a span of just 15 minutes took over 7,000 precious lives in a narrow strip close to the sea, most of them in Nagapattinam district.

Sanitation has been among the lowest of priorities of government and people even in the best of times. It is hence no wonder that in the context of heavy human loss needing a mammoth effort for rebuilding and rehabilitating the coastal communities' sanitation received only a low priority. And the problem was worsened by the fact that the Tsunami victims mostly fishermen living so close to the bottomless ocean and endless stretches of sand had known very little about toilet culture.

The Tsunami offered an excellent opportunity to the authorities and other stakeholders to mainstream

the families in the field of sanitation, hygiene, solid waste management and community participation in the operation and maintenance of so many facilities provided to them. The best administrative and financial support that poured in from all over the country and outside unfortunately were not made use for improving the quality of life of the people by providing them with safe and dignified toilets.

Justifiably busy with a plethora of problems to reduce the misery of the victims the government took almost one year to take a decision as to where to locate the permanent houses in view of the rules regarding coastal zone construction. Then due to public pressure it hurriedly came out with about ten designs of houses and unfortunately the designs did not pay adequate attention to incorporate a sustainable sanitation system for each and every house. It provided only a toilet and everyone knows that the sanitation system is much more than a simple toilet to collect the human waste.

A deadline for the completion of houses was fixed due to the pressure of the affected families and a clear indication of the funding agencies and NGOs that they would like to finish their job and get out of the places at the earliest. The heavy rains in 2005 monsoon flooding most of the areas designated for construction of new houses, rise in cost of all construction materials, scarcity of good masons to take up the construction all resulted in hurried construction of the houses and also the toilets. This has resulted in construction of tens of thousands of new houses for the families without a proper toilet.

Silver lining

The prolonged stay in over 70 temporary shelters with makeshift toilet and drinking water facilities extending for more than two years had a positive change in the attitude of the people with regard to open defecation. Continued social mobilization by NGOs and government agencies had made them realize the importance of toilet culture for a healthy and hygienic life with dignity.

The Tragedy

But when they moved to their permanent houses with all hopes they found the toilet system was not functioning efficiently and many of them were forced to resort to open defecation with a very heavy heart and a feeling of having lost some new means for a comfortable and dignified life.

The government goaded on by national and international health and hygiene expeperets and pollution specialists in 2007 decided to go in for new technologies to solve the problem of pit latrines in the high water table, low and heavily flood prone coastal areas where the houses had been built. The fluidized Biological Bed reactor(FBBR), Single Pass Intermittent Sand Filter(SPIF) and the Decentralized Wastewater Treatment Systems(DEWATS) with financial support from the World Bank and other agencies pilot plants were to be built up in selected permanent shelters(numbering over 40) which could be extended to all other permanent shelters in the second phase. The work employing these new technologies is now being implemented by the TWAD board. Any visitor to these new habitations could see the construction of collection tanks from each house laying of sewer pipes from house to house and to the treatment facility which are at various stages of construction. One is not very sure when these treatment facilities will be commissioned and who will be in charge of the operation and maintenance of the same in the years and decades to come.

Shining Example

Among scores of such new habitations where people are forced to go for open defecation and waiting for a proper sewage treatment facility one could see a few centers where ECOSAN toilets considered to be the best model for such coastal and flood prone areas with minimum operation and maintenance are functioning well. Committed NGOs have constructed about 3,000 ECOSAN toilets in these habitations. ECOSAN toilet is a new technology which requires behavioural change and close

monitoring in the initial stages. These NGOs have been recently successful in creating models which could be replicated if and only if an integrated and well thought out plan to build ECOSAN toilets could be drawn up and people motivated to accept the usage practices.

Conclusion

One only hopes that the government takes a re look at all existing sanitation models now under construction or in use and entrust the work of providing a sustainable sanitation systems to an agency with adequate financial and administrative support within a stipulated timeframe. If not the half watched attempts to provide toilets to thousands of houses will end up in the toilets becoming a source of grave pollution and health hazard in the entire coastal belt with disastrous consequences worse than the Tsunami.

Theme

Sanitation Demand Creation through Effective Hygiene Promotion

WASH For All: Improving lives of People Living With HIV and AIDSs through WASH services

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People living with HIV and AIDS (PLWHAs) are discriminated in society, economically, socially and psychologically. The immuno-compromised status of PLWHA renders them more susceptible to opportunistic infections like diarrhoea, one of the most common symptoms of HIV infection and experienced by over 90% of patients with AIDS.

Diarrhoea frequency increases as immune deficiency progresses. Some of these diarrhoeal diseases are likely to be severe, recurrent and persistent, and are often associated with weight loss Diarrhoea in HIV-infected individuals may be either acute (<7 days), or chronic (three or more liquid stools daily for >14 days).

The link between diarrhoea and lack of access to safe water, sanitation and hygiene is well established. Easily accessible and sufficient water and sanitation, coupled with the adoption of hygienic practises are thus indispensable for PLWHA and for their home-based care. Safe drinking water is necessary so that the already immuno-compromised person is not put under additional stress. Moreover, patients under ART (anti retroviral therapy) need to drink more water. Access to toilets and safe sanitation is necessary to prevent waterborne disease. Water is also needed for bathing patients, washing their soiled clothing and linen, and to keep the environment (house and toilets) clean, in order to reduce the risk of opportunistic infections.. It is important that water supply points and toilets are easily accessible and close to where they are needed. This reduces the burden of long distance water collection by caregivers or those who are weak.

In 2008, WAI entered into a partnership with UPSACS (Uttar Pradesh State AIDS Control Society) for a project titled Program on Arresting Opportunistic Infections for PLWHA to help improve quality of life of PLWHAs through water, sanitation and hygiene. The project was undertaken with CREATE, an implementation partner of WAI, in 14 districts by coupling with ART and through , DLNs (District Level Network), DICs (Drop In Centre) and CCCs (Community Care Centres). These centres served as information hubs on WASH where PLWHAs were able to learn about key WASH issues through posters, pamphlets, WASH Games kit, audio and video CDs and through group and individual counselling. As the centres were also provided with water sanitation facilities (water filters, washbasins, urinals/latrines restoration), the PLWHAs visiting the centres were able to get direct benefit on using the same. The staff of the centres was trained on WASH and were able to counsel the PLWHAs on the critical need for WASH in their lives.

The project has been able to reduce opportunistic infection in PLWHA. WAI is now moving towards integrating and mainstreaming WASH for PLWHA into HIV/AIDS programming and also into WASH programming. This paper describes the activities that were undertaken under the project, the difference it has made in the lives of PLWHAs and the possibilities for future action.

"IEC: To enhance the adaptive capacity of the community to sanitation affliction"

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Key words: adaptive capacity, community participation, Information Education and communication

Sanitation has always been one of the important problems hindering the progress of the nation. In urban areas people belonging to rich section of society and have access to sanitation facilities however it is the poor who is suffering due to the lack of this basic amenity. They spend quality time and a large portion of their monthly income in accessing them. Women are the main sufferers as their physical hardships, vulnerability to problems increases with the absence of sanitation facilities.

Although, various initiatives in the form of policies and programmes have been taken, to provide and maintain these basic amenities, but they fail to reach their desired goal. One of the reasons is the lack of community awareness and participation. During a study conducted in Madanpur Khadar, a resettlement colony in the outskirts of Delhi it was seen that in spite of the availability of community toilets a majority of the community (73.8%) was defecating in open. One of the major reasons mentioned by the community was that these services were not maintained properly. Secondly, as community was not involved in the planning stage of the programme the location of community toilets was not convenient to a few groups.

Thus, it can be clearly stated that it's not just necessary to create the facilities but also to keep in mind the requirements of the community and to maintain them. This can only be ensured when community is involved from the very first step of the programme rather than just implementation. Participation of community in any programme planning gives them a sense of relatedness and ensures better management of the services and assets provided. Need from the community should be generated by making them aware making their unfelt need felt and there by creating a demand for the facility thus ensuring better success of the programme.

Adaptive capacity of a community cannot just be improved by providing technical support or suggesting a better alternative. Adaptive Capacity is a function of income, wealth, education and awareness. Adaptive capacity needs to be increased by creating awareness and giving knowledge to people so that they themselves can take steps to curb the problem. Active participation of the community is very important in the success of any programme, Information Education and Communication ensures that people are aware and motivates them to participate and take actions for their own betterment.

Community contribution for Environmental Sanitation Myth or Reality

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Worldwide, the drinking water and sanitation projects were viewed as a base for promoting public health, because the sanitation facilities interrupt the transmission of much faecal-oral disease at its most important source by preventing human faecal contamination of water and soil. Under sector reforms the government, of late, assigning a greater role to the private sector, NGO's and the community in various sector, including rural water supply and sanitation programmes. Further under sector reforms, the community has been asked to share and recover the cost involved for efficient function to reduce burden on state exchequer. This paper tries to investigate how and what extent the paradigm shift has taken place in sharing the cost by community in provision of water and environmental sanitation through user charges with following set objectives:

Objectives:

- To examine community contribution for environmental sanitation.
- To examine role of community in spreading awareness on environmental sanitation: and
- To examine equity, efficiency in delivery of sanitation services.

Approach and Methodology:

To test the set objectives multiple sampling method was used to choose the villages. Of the total villages under the programme, two sets of samples were selected, first from 1104 project villages 10 percent selected randomly (112 villages) spread across 12 districts. Followed by purposively all the pilot phase villages (9, spread across state) were selected. The required secondary data was collected from Village Water Supply Committee (VWSC), NGO and Gram panchayat the primary data was collected from selected households. The result brings out that the community unable to contribute for the capital cost and recovery or meet the full cost of operation and maintenance. Hence, the alternative is privatization of services, entrusting the job of regulatory power to local governance for day to day monitoring, for which statutory sanction was provided. The alternative is involving the NGOs in operation and maintenance.

Rural Sanitation Possible role of Construction Technicians Training Institutes

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1. A large number of people in India do not have access to safe and convenient water supplies for drinking, personal hygiene and domestic purposes. Even fewer people have adequate waste disposal facilities. The high incidence of water- and excreta-related diseases especially in rural areas results from unsatisfactory water supplies and poor waste disposal systems. Proper use of water and sanitation systems can eliminate such diseases.
2. Water and sanitation system development can alleviate the economic, social problems and boost the proliferation of economic and overall development of a community.
3. According to World Development Report 2005, of the India's total population of 1.1 billion the Water supply coverage is 86% and Sanitation coverage 30%. According to Ersey et al. 1990, in their report Health benefits from improvements in water supply and sanitation: Survey - Using a pit latrine and disposing of children's feces in it can reduce diarrhea incidence by 36 per cent or more. The official coverage for rural sanitation is 26% and for urban - 83.2% (Source: 2005-06 NFHS data). The overall sanitation coverage as recently announced by the government is 48%.

What can be done?

With about 750 million rural population and with about 188 million rural house holds it is estimated that 62% i.e. 116 million house holds of these are not having access to safe and hygienic sanitary arrangements. The problem is gigantic in nature and is beset with issues relating to economic status, mind set and social circumstances. While Government of India, State governments and some of the International bodies are keen to eradicate the practice of open defecation, none the less, required number of qualified and trained technicians to build these assets are in short supply.

The planners have always bestowed lot of attention on the qualification of Engineers and Architects. It has always been a case of neglect when it came to the Indian Construction Trades Technicians. As a matter of fact it is to be taken for granted that the Indian technician is well versed based on the hierarchical system. Here, one must pause and take a look at the scenario of the skilled work force in our country. If rapid industrialization and by sheer nature of the shifting constructions industry, the traditions have been given a go by and the old hierarchy system almost died a premature death. It was then realized by the building industry that there is a positive need for inculcating skills in the construction work force so that trained and qualified construction technicians can replace old hierarchy and help the mammoth industry. Such is the scenario in which NAC took birth in September 1998 and today it has grown by leaps and bounds and came to be regarded as a bench marking institution in so far as the Construction Technicians Trades Training is concerned.

NAC has been conducting training programmes on Rural Sanitation and Rural Water Supply since 2002. The modus operandi is to train large number of Masons in a comprehensive. 3 days multi skilled training in construction of Individual House Hold Sanitary Latrines (IHSL), this programme was quite successful and was well received by the beneficiaries.

NAC is pleased to say that 10,000 masons were trained in multi skills in the year 2002 & 2003. In this multi skilling the participant trainees were given inputs in the maintenance of rural water supply purification and testing of drinking water, laying of pipelines, valves, operation of various kinds of

pumps, bore wells, retrieval of submersible pumps, electrification and individual connections to households all these aspects inputs are connected for conducting an ISHL.

A typical format in the Course content is given at Annexure I. A detail paper on the subject will be submitted shortly.

It is hoped that this will instill a measure of thinking with in the construction industry and help in capacity building resulting in better quality of life of our country men.



National Conference on
Cost Effective Sustainable Sanitation
An Indian Experience



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