



Environment

Water Community



Food and Nutrition Security
Community



Solution Exchange for the Water Community Consolidated Reply

*Query: Urban Waste Composting Methods and Uses for
Agriculture - Experiences; Examples*

Compiled by Gopi Ghosh, Resource Person and Ramya Gopalan and T.N. Anuradha,
Research Associates

Issue Date: 31 December 2007

From [Avanish Kumar](#), Toxics Link, New Delhi

Posted 31 October 2007

Rapid urbanization has put Third World cities in an urban crisis. Municipal authorities, in third world cities, have not been able to dispose off urban waste in a scientific and eco-friendly manner. Inappropriate waste disposal technologies have only intensified the problem. Composting has been promoted as an eco-friendly and sustainable solution to urban waste management. However, experiences of composting projects have not been very good. The most negative aspect of this significant issue is the fact that very little analysis of the failure of past projects is available, especially in India. Research and analysis on various issues regarding composting are very much needed to promote eco-friendly practices particularly in Agriculture.

Toxics Link is carrying out a study on composting methods, types, processes, marketing and prospects in context of Municipal Solid Waste Management (MSWM) in India with the intention of promoting their use for Agriculture. I would therefore appreciate members from both the Water and the Food and Nutrition Communities to provide their inputs, suggestions and field experiences on the following:

- Information on various composting approaches specifically those appropriate for Agriculture, composting techniques (traditional and those currently in use), and the legal and policy framework involved – especially in the context of MSWM
- Case Studies of composting projects in India including decentralised and commercial composting units, highlighting operational and managerial constraints
- Information on current marketing scenario for compost and challenges in compost marketing

The final report of this research would be used as an advocacy tool to promote sustainable and scientific practices MSWM with forward linkages to Agriculture. Member's contributions on the Solution Exchange Network would be duly acknowledged in the report.

Look forward to your responses

Responses were received, with thanks, from

1. [Sam Livingston](#), ADRA India, Andaman & Nicobar Islands
2. [Romit Sen](#), WaterAid India, New Delhi
3. [K.V. Peter](#), Kerala Agricultural University, Thrissur, Kerala
4. [Usha Srinivasan](#), Development Alternatives, New Delhi
5. [Arunabha Majumder](#), Jadavpur University, Kolkata
6. [S. Mukherjee](#), Madras School of Economics (MSE), Chennai
7. [Susan Sharma](#), Wildbytes.tv, Gurgaon
8. [Harshad Gandhi](#), Excel Industries Ltd., Mumbai
9. [S. Vishwanath](#), Arghyam Trust & Rainwater Club, Bangalore
10. [Jyotsna Bapat](#), TERI, New Delhi
11. [R. Santhanam](#), Indian Society of Agribusiness Professionals (ISAP), New Delhi

Further contributions are welcome!

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[Comparative Experiences](#)
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Summary of Responses

Household and industrial wastes contribute largely to most of the solid waste in majority of the Indian cities. These wastes usually dumped in public places causing serious health implications. Urban waste composting methods intended for use in agriculture can play an important role in addressing this problem. Responding to a query on how to promote urban composting, respondents recommended various approaches and techniques, highlighted several issues while deciding on composting options for urban areas, and outlined lessons learned from ongoing Municipal Solid Waste Management (MSWM) initiatives.

Members highlighted many **challenges involved in the waste disposal** processes and the need for proper segregation of domestic waste into biodegradable and non-biodegradable elements at source. They also mentioned related issues including the problem of getting trained people to manage waste collection, segregation, and disposal along with maintaining composting units and identifying suitable markets for selling the compost.

To address these challenges, discussants made several recommendations. One, waste management at the household level must be inculcated among family members and simultaneously introduce waste management (in theory and practice) into school curricula. Further, they suggested making dumping wastes in public places a non-bailable offence.

Discussants enumerated **experiences** using different kinds of composts and approaches to engage schools, local NGOs, communities and women self-help groups. For example, on the

Andaman Islands, a post-tsunami livelihoods project produces compost for agricultural purposes and [Poabs](#), **Kerala** standardized the management of urban wastes, into manure for plantations and manure for horticulture. Members also mentioned efforts by [CLEAN-India](#) to provide community-based mechanisms for managing organic waste and to encourage the community's active participation. Additionally, waste paper recycling units have been installed in some schools and offices to convert waste paper into recycled hand made paper.

Other successful initiatives included vermi-composting with epigeic earthworm species, enzyme-based waste management (using a biocatalyst and a bio-sanitizer), and city farming to manage biodegradable food and horticulture wastes. The towns of Palani and Dindigul in [Tamil Nadu](#) are using these in a community based decentralized waste management system that converts wastes into compost, which is then sold to farmers and residents. One respondent discussed instances of using vermi-composting of vegetable (household) wastes in **Pune**, although such practices were found to be mainly limited to upper middle class localities.

Internationally, discussants noted how **Israel** and **China** have developed novel composting technologies and are converting liquid and solid wastes into income generating options.

Drawing from experiences respondents discussed and compared certain **technology options available for composting**, such as:

- Vermicomposting: widely used as a technology for solid waste management, which if correctly utilized, will produce compost with an income. The critical issue is proper care and choice of earthworms. For example, in the **United States** and **Australia**, Eisenia Foetida worms are used successfully.
- Enzyme-based composting: uses biocatalyst and bio-sanitizer technology for composting. It does not require much maintenance and can be used at the community level.
- Organic Waste Converter (OWC) System: developed by Excel Industries Ltd. It reduces bioconversion time-cycle to 10 days and is useful for community clusters or bulk waste generator projects.
- Vermi-bed method: two chambers are constructed using hollow blocks. One chamber contains segregated household waste and cow dung slurry, added to hasten the decomposition process. The partially decomposed waste is then transferred to the other chamber where earthworms are added, allowing the vermicompost to be harvested in 45 days.
- City farming: "farming" approach for urban areas, using terraces, balconies and walls. Adopted by many households in residential colonies, which do not have unpaved soil space to manage organic garbage in their own houses for growing vegetables, fruits, etc.
- Windrow process: applicable to cities where solid waste contains 45-65% organic garbage. Using this process, waste can be converted to compost in 21 days, and in 36 days be screened and packed.
- Methanation: use the left over slurry in the methane digester as manure. This method is comparatively free of pathogens and weed seeds, however it is not completely stabilised and tends to be acidic.
- Compact Biodigester: treats spoiled food materials, like grains. It treats waste through a "sequence and process flow," which is different for different types of bio solid wastes.

Discussants also listed other techniques used to manage wastes and highlighted how uniform substrates like animal and human excreta are easily amenable for fermentation using mesogenic bacterium, making conventional bio-gas digesters better suited for this application.

Along with outlining specific technologies, respondents discussed how production costs, along with environmental costs, may be higher than sale value and thus a subsidy may be required to

promote composting, necessitating a policy decision. They also felt standardizing composting processes is important, so they would be applicable to metros and small cities.

Finally, respondents stressed the importance of modifying waste management techniques to address the complex range of solid waste produced, so that communities are able to effectively segregate and treat the waste generated in homes, on farms and as a result of manufacturing in a holistic and sustainable manner.

Comparative Experiences

From [Usha Srinivasan](#), *Development Alternatives, New Delhi*

Tamil Nadu

Organic Composting Unit by Women, Peruyappa Nagar, Palani

As a temple town, Palani receives many pilgrims and tourists leading to unmanageable increases in solid wastes and improper sanitation conditions. Palani Hill Conservation Council with CLEAN-India students and local communities successfully set up community composting unit at Peruyappa Nagar. They trained a 20 women group on composting methods using earthworms and Enzymes in raised beds of coconut husk and cow dung, also selling compost to farmers

Kurinji Women's Eco Club, Dindigul

CLEAN-Dindigul students of M.S.P. Solai Nadar Memorial H.S.S. organized a meeting with residents of Rani Mangammal Colony to manage organic wastes of the colony, usually dumped on roadsides. Thus began a small initiative by 14 homemakers, which grew into a colony level vermi composting system, earning about Rs. 3000 per month by selling 750 kg of compost at Rs 4 per kg. The vermi-compost is heavily demand and used by area residents in their gardens.

From [Ramya Gopalan](#), *Research Associate*

Karnataka and Maharashtra

Compost from 'Press Mud' Of Sugar Industry and 'Spent Wash' Of Distillery

Project initiated four distilleries where samples of compost and of the soil were collected. Ground water samples were also drawn from these sites. Preliminary observations indicated that composting if done scientifically with adequate managerial techniques could be a viable solution for distillery waste and may result in zero discharge. Composting of press mud and spent wash treats wastes and provides revenue given high sugarcane yields and cost savings in fertilisers

International

Mexico

Bell Method of Solid Waste Clearance

The Government passes an Act & Rule for improving SWM system to local masses disallowing dumping of solid wastes in open public places. Disobedience invites a strict imposition of a fine by the city police. The Act and Rule mentions that, everybody keeps their waste in a box or bag and brings it when the municipal solid waste clearance vehicle arrives at a specific time daily ringing a bell to announce its arrival. The time and place is notified to the public.

Related Resources

Recommended Documentation

Poabs To Operate Solid Waste Treatment Plant (from [K.V. Peter](#), Kerala Agricultural University, Thrissur, Kerala)

Article; The Hindu; Kozhikode; 26 December 2004

Available at <http://www.hindu.com/2004/12/26/stories/2004122609770300.htm>

Discusses Kozhikode Corporation's efforts to engage Poabs Enviro Tech Private Limited on license basis to operate the solid waste treatment plant at Njeliyanparambu

Can We Do Something About The Garbage Littered On Our Roads (from [Susan Sharma](#), Wildbytes.tv, Gurgaon)

Chat Archive Moderated; by Veena Nagpal; Indian Wildlife Club; 18 July 2007

Available at <http://www.indianwildlifeclub.com/mainsite/chatarchive.asp?CID=56>

Provides suggestions on how individuals can undertake efforts to manage solid wastes on roads and in school - recyclables, bio and non bio degradables.

Biosolid and Liquid Wastes Management Using Biosanitiser Based Stabilisation Process and Methanation (from [R. Santhanam](#), Indian Society of Agribusiness Professionals (ISAP), New Delhi)

Research Paper; by R. Santhanam

Available

at

http://www.wesnetindia.org/fileadmin/newsletter_pdf/Aug06/Waste_Management.pdf (PDF Size: 231 KB)

Reviews the process of methanation, vermiculture technology and biosanitiser recommending a holistic approach to managing waste for clean energy and soil nutrients

From [Ramya Gopalan](#), Research Associate

The Municipal Solid Wastes (Management and Handling) Rules, 2000

Notification; Ministry of Environment and Forests, Government of India; Publisher; New Delhi; 25 September 2005

Available at <http://envfor.nic.in/legis/hsm/mswmhr.html>

Rules apply to every municipal authority responsible for collection, segregation, storage, transportation, processing and disposal of municipal solid wastes

Status of Municipal Solid Waste Management in India

Status Report; Central Pollution Control Board (CPCB)

Available at [Link](#)

Provides an inventory of municipal solid wastes generation, collection, transportation and disposal in Class -I cities and Class II towns

Studies on Compost Quality and its Application in Agriculture

Study Paper; Central Pollution Control Board (CPCB) and Indian Agricultural Research Institute (IARI); New Delhi

Available at <http://www.cpcb.nic.in/News%20Letters/Archives/R&D%20for2003/solidwaste.html>

Covers safe and beneficial use of municipal solid waste compost/sewage sludge on agricultural fields and its environmental impact

Solid Waste Reuse And Urban Agriculture--Dilemmas In Developing Countries: The Bad News And The Good News

Article; by Christine Furedy And Tasneem Chowdhury; Association of Collegiate Schools of Planning and Association of European Schools of Planning, Joint International Congress, Ryerson Polytechnic University; Toronto; 26 - 28 July 1996

Available at <http://www.cityfarmer.org/Furedy.html>

Discusses two urban management strategies for the developing countries-urban agriculture and reduction/reuse of solid waste and introduces issues of public health

Municipal Solid Waste Management through Vermicomposting Employing Exotic and Local Species of Earthworms

Study; by Kaviraj and Satyawati Sharma; 26 March 2003

Available at <http://eprint.iitd.ac.in/dspace/bitstream/2074/1232/1/kavirajmun2003.pdf> (PDF Size: 890 MB)

A comparative study conducted between exotic and local species of earthworms for the evaluation of their efficacy in vermicomposting of municipal solid waste (MSW).

Compendium of Best Practices in Municipal Waste Management

Compendium; City Managers' Association of Maharashtra (CMAM); 2004 - 2005; Permission Required: Yes. Paid Publication

Available at http://jnnurm.nic.in/best_prctices/English/Vol-II/01.CMAM_Cover.pdf (PDF Size: 178 KB)

Shares information and experiences of city waste management practices

Municipal Solid Waste Management & CDM Potential

Presentation; by Inderjeet Singh; ICMG-Clear Skies and Senergy Global; February 2005

Available at http://www.incmg.org/Presentations_17.2.2005/MSW_SG_IS.pdf (PDF Size: 258 KB)

Explains difficulties municipalities face in addressing issues of urban waste management, provides options for managing waste, generating electricity & reducing risk under CDM

From [T.N.Anuradha](#), Research Associate

Solid Waste Reuse and Urban Agriculture--Dilemmas In Developing Countries: The Bad News And The Good News

Article; by Christine Furedy And Tasneem Chowdhury; City Farmer; Canada; 1996

Available at <http://www.cityfarmer.org/Furedy.html>

Introduces the basic issues of public health arising from solid waste reuse in urban agriculture

Rethinking Waste Management in India

Article; by Sanjay K. Gupta; Toxics Link; Humanscape; 20 April 2001

Available at <http://www.toxicslink.org/art-view.php?id=9>

Emphasises the need for urban waste recycling to first provide organic soil nutrients to the farmers and to solve the urban waste problem

Reusing Organic Solid Waste In Urban Farming In African Cities: A Challenge For Urban Planners

Paper; by R. Asomani-Boateng and M. Haight; International Development Research Centre

Available at http://www.idrc.ca/fr/ev-33948-201-1-DO_TOPIC.html

Examines the concept of waste reuse urban farming (WRUF) as a unique local solution to address municipal solid waste problems in African cities

International Source Book on Environmentally Sound Technologies (ESTs) for Municipal Solid Waste Management (MSWM)

Book; United Nations Environment Programme

Available at <http://www.unep.or.jp/ietc/estdir/pub/msw/index.asp>

Provides a list of environmentally sound management of municipal solid waste (waste reduction, collection and transfer, composting, etc) around the world

Reuse of Wastes and Wastewater

Article; Resources Centre on Urban Agriculture and Food Security

Available at <http://www.ruaf.org/node/47>

Looks at the important role urban agriculture can play in transforming urban wastes into valuable resources

Eco Tools for Urban Waste Management in India

Paper; by V.P. Upadhyay, M.Rajeswar Prasad, Ajay Srivastav and Khazan Singh; Ministry of Environment and Forests, Meghalaya and Orissa

Available at this [link](#) (PDF, Size: 200 KB)

Highlights the present scenario of waste management and the options available to convert these wastes into useful products, like composting for agricultural use

Recommended Organizations and Programmes

Poabs Green, Trivandrum (from [K.V. Peter](#), Kerala Agricultural University, Thrissur, Kerala)

Vilappilsala, Trivandrum, Kerala; Tel: +91 471 882696; Fax: +91-471-882780
mail@poabsgreen.com; <http://www.poabsgreen.com/>

POABS standardized management of urban wastes into manures, for use in plantations and horticultural crops. Beneficial fungi fortify the nutrient value of the composts.

Recoup Recycling, United Kingdom (from [Romit Sen](#), WaterAid India, New Delhi)

1 Metro Centre, Welbeck Way, Woodston, Peterborough PE2 7UH; Tel: +44 (0) 1733 390021;
Fax: +44 (0) 1733 390031; amy.wingrove@recoup.org;

<http://www.recoup.org/business/default.asp>

Undertakes and provides funds and technology for recycling plastics with the aim of maximising efficient plastics recycling

Community Led Environment Action Network (CLEAN-India), New Delhi (from [Usha Srinivasan](#), Development Alternatives, New Delhi)

Development Alternatives, B-32, Tara Crescent, Qutub Institutional Area, New Delhi - 110016;
Tel: 91-11-26134103/26890380; Fax: 91-11-26130817 Email;

<http://www.cleanindia.org/programme.htm>

Undertaken initiatives like vermi-composting, enzyme based waste management and city farming to manage bio degradable food and horticulture wastes.

Recommended Portals and Information Bases

International Conference on Sustainable Solid Waste Management, Centre for Environmental Studies (CES), Anna University, Chennai (from [S. Mukherjee](#), Madras School of Economics (MSE), Chennai)

http://www.swlf.ait.ac.th/IntlConf/Data/ICSSWM%20web/ICSSWM_Programme%2016.08.07-%20serial%20no%20Removed.htm

Contains papers and presentations on SWM drawing from Asian countries, highlighting approaches on managing sustainable municipal solid waste management

Daily Dump - Compost at Home, Bangalore (from [S. Vishwanath](#), Arghyam Trust & Rainwater Club, Bangalore)

<http://www.dailydump.org/>; Tel: +91-80-41152288; dailydumpcompost@gmail.com

Offers a range of products and services that help compost at home and also provides solutions and knowledge through an open source platform, aimed at making waste useful

Recommended Tools and Technologies

Organic Waste Converter (OWC) System (from [Harshad Gandhi](#), Excel Industries Ltd., Mumbai)

Tool; Owned by Excel Industries Ltd., Mumbai. Permission Required: Yes, contact the Organisation for more details.

Available at <http://www.excelind.co.in/cat.htm>; Contact Environ-Biotech Division; Tel: 66464200; mohan@excelind.com

Reduces bioconversion time-cycle to 10 days and can be used for community cluster or bulk waste generators based on information regarding waste generation per day

Compact Biogas Plant (from [R. Santhanam](#), Indian Society of Agribusiness Professionals (ISAP), New Delhi)

Waste Conversion Plant; Owned by Appropriate Rural Technology Institute, Pune

Available at <http://www.bioenergylists.org/en/compactbiogas>; Contact Dr. A.D. Karve

A compact, low cost digester for bio-gas production using any waste (or non-edible) starchy and sugary feedstocks

Related Consolidated Replies

Use of Human Excreta for Agriculture Nivedita Varshneya, German Agro Action/Deutsche Welthungerhilfe (DWHH/GAA), New Delhi (Experiences). Food and Nutrition Security Community and Water Community

Issued 30 September 2007. Available at <http://www.solutionexchange-un.net.in/food/cr-public/cr-se-food-wes-11090701-public.pdf> (PDF, Size: 303 KB)

Provides ongoing practices and emerging technologies, outlines risks and precautions in handling such waste and suggests mechanisms for an integrated operational approach

Solid Waste Management in Urban Settings, from Nidhi Prabha Tewari, Sanket Information & Research Agency, New Delhi (Advice). Water Community

Issued 16 August 2005. Available at <http://www.solutionexchange-un.net.in/environment/cr-public/cr-se-wes-16080501-public.pdf> (PDF, Size: 115 KB)

Highlights successes and failures of recycling and revenue generation potential of solid wastes through case studies

Responses in Full

[Sam Livingston](#), ADRA India, Andaman & Nicobar Islands

Making compost out of the solid waste is the need of the hour. We need to explore new methods for this cause.

One should know how to segregate the waste, there are many challenges involved in this. I am heading a post tsunami project in Andaman namely ensuring environment and livelihood security. In this project we have a component called Environment clean up livelihood, in other words make livelihood out of waste.

We are currently exploring different kind of compost (Vermi compost, Quick compost (fungus method) and EM1 compost). We are attempting to make compost for irrigation purpose. Here in the Andamans we have a lot of coconut wastes, several hectares of land was affected /submerged

by sea water and the coconut / arecanut trees have died, we are trying to make compost out of these dead trees (as they are half composed / or could not be used for timber).

I wish to know from the group if any one has some experience regarding what we are attempting here. We also wish to recycle the plastics / PET bottles or send it to main land (Chennai or Kolkata) plastic factories for recycling. Ideas and suggestions are most welcome.

Romit Sen, WaterAid India, New Delhi

Vermi-composting is being widely used as a technology for solid waste management. Critical issues with respect to vermi-composting are taking care of earthworms. If taken care in a proper manner-vermi-composting is an effective way of composting and can be used as a way of income generation for the marginalised section of the society.

An enzyme based composting method is also been used. This technology makes use of a bio-catalyst and bio-sanitizer for composting. This method does not require much maintenance and is being used at the community level.

Some issues when looking into composting solutions for urban areas are:

- Proper segregation of domestic waste into bio-degradable and non-biodegradable fraction at the household level.
- Assigning trained people for managing the waste collection, segregation, disposal and maintenance of the composting unit.
- Identifying suitable markets for selling compost

In response to the question asked by Mr Livingston about recycling plastics, one may visit the site of Recoup Plastics (<http://www.recoup.org>), an organisation in UK. They also provide funds and technology for recycling plastics.

K.V. Peter, Kerala Agricultural University, Thrissur, Kerala

Waste composting methods and uses in agriculture are extremely relevant and equally sensitive subjects. The Cities in majority of states are heaped with solid wastes, may be food wastes, carcasses, industrial wastes and mining and quarry wastes.

POABS in Kerala has standardized management of urban wastes into manures used in plantations and horticultural crops. Nutrient value of the composts are fortified by beneficial fungi. A policy on packaging of the cycled wastes to usable manures is to be taken by the Government. So far we have no policy on waste management. We dump the waste in uninhabitable areas. Once the area becomes habitable, the whole issue of environmental pollution crops up.

Israel has technologies to manage both liquid and solid wastes. Chinese has done extremely well. Waste is wealth for them. Unfortunately, so far we do not know what to do with the solid waste except employing thugs to dump the wastes in public places, which later pollute the area causing untold miseries to people, new diseases and epidemics erupting. Dumping wastes in public places should be a non-bailable offence. Simultaneously we should include waste management as a theory and practical in our school curricula. At home, waste management should be inculcated among family members.

Usha Srinivasan, Development Alternatives, New Delhi

I am sharing with you some of our initiatives for waste management :

Solid Waste Management- Composting and Waste Paper Recycling

CLEAN-India Initiatives

The problem of solid waste management plagues most Indian towns and cities. are not in place and municipal bodies are not equipped to manage the wastes properly. Proper and efficient collection and disposal of solid waste is a major problem in all towns and cities in every part of the world. CLEAN-India has been aiming at community-based mechanisms for managing organic waste, encouraging people participation.

CLEAN-India (Community Led Environment Action Network) is a Nationwide Environmental Assessment, Awareness, Advocacy and Action Programme of Development Alternatives which mobilizes community responsibility for Environmental improvement in the cities and towns of India through a network of schools and NGOs in collaboration with Government, business, academic and other institutions.

Various initiatives like vermin-composting using epigeic earthworm species, enzyme based waste management (using a bio-catalyst and a bio-sanitizer) and city farming have been successfully taken up to manage the bio degradable food wastes and horticulture wastes.

Waste paper recycling units have been installed in schools and offices to convert waste paper into recycled hand made paper.

The schools, local NGOs, communities and women self help groups from the towns of Palani and Dindigul (Tamil Nadu) and many others like Sagar, Aurangabad, Amreli, Udipur etc. are implementing the community based decentralized waste management systems and converting the wastes into compost which is sold to farmers and the residents.

Two case studies are enclosed:

Peruyappa Nagar, Palani, Tamil Nadu

Palani, the temple town and abode of Lord Murugan, situated near Kodaikanal in Dindigul District of Tamil Nadu, is the third most visited Hindu shrine in south India. Pilgrims and tourists, almost 50% of Palani population come here each day to visit the temple. Unmanageable increase in solid waste generation was leading to improper sanitation conditions in the town.

Palani Hill Conservation council with the help of CLEAN-India students and the local community have successfully set up community composting unit at Peruyappa Nagar.

A group of 20 women got trained on methods of composting using earthworms and Enzymes in raised beds of coconut husk and cow dung. This method was selected for composting at Peruyappa Nagar. The women have been able to successfully set up the composting unit (near the Municipal dumping site) using all organic matter from 140 households which is segregated at source and then collected. The result was high quality organic compost. The women at Peruyappa Nagar have benefited by selling the compost to the local farmers.

Kurinji women show the way (Dindigul)

A dedicated group of women in Dindigul, a small town in Tamil Nadu came together to form an "Eco Club" and learnt to make money out of waste!

In an effort to initiate community based solid waste management system, CLEAN- Dindigul students of M.S.P.Solai Nadar Memorial Higher Secondary School organized a meeting with the residents of Rani Mangammal (RM) Colony to manage the organic wastes generated in the colony, which was otherwise dumped on the roadsides.

Getting started

What started as a small initiative by a small group of 14 housewives grew into a colony level vermi composting systems steered by the "Kurinji" women.

A vermi-bed with two chambers was constructed using hollow blocks. Segregated waste collected from the houses was added to one of the chambers and Cow dung slurry was added to the waste to hasten the process of decomposition. This partially decomposed waste was transferred to the other chamber where the earthworms are added. This process of partial decomposition in one chamber and vermi-composting in the other is continuous and is carried out simultaneously. The vermi-compost is harvested in 45 days.

An average of 750 kg of compost is generated each month, which is sold at Rs 4 per kg thereby earning revenue of Rs 3000 per month. The vermi-compost is in heavy demand in the area as the residents use it in their gardens.

City Farming: Many households in residential colonies which do not have unpaved soil space have adopted city farming which deals with the farming in urban areas and essentially on terrace, balconies and even on the walls of civil construction for management of organic garbage in their own houses for growing vegetables, fruits etc.

Arunabha Majumder, Jadavpur University, Kolkata

Indian city solid waste contains 45 to 65% garbage (Organic). It can be converted to compost by Windrow process. It will take 21 days to convert garbage to compost. We keep another 15 days for maturation before screening and packing. Average characteristics of compost: N-1.2%; P-0.7%; K-1.1%. Process requires turning at specified interval. Watering is required on regular basis for keeping specified moisture content.

Production cost may be higher than sale value. We have to consider Environmental Cost. Accordingly subsidy is required. A policy decision is to be taken to promote Composting.

Vermiculture is also a good process to get compost.

S. Mukherjee, Madras School of Economics (MSE), Chennai

The following link contains some papers, which could be useful:

International Conference on Sustainable Solid Waste Management

5-7 September 2007, Chennai, India

http://www.swlf.ait.ac.th/IntlConf/Data/ICSSWM%20web/ICSSWM_Programme%2016.08.07-%20serial%20no%20Removed.htm

Contains papers and presentations on managing solid waste management drawing from Asian countries, highlighting approaches on managing sustainable municipal solid waste management

Susan Sharma, Wildbytes.tv, Gurgaon

We had an interesting online chat on urban waste. You can read the transcript at <http://www.indianwildlifeclub.com/mainsite/chatarchive.asp?CID=56> - The moderator is running an NGO to promote the idea of waste management in schools.

Harshad Gandhi, Excel Industries Ltd., Mumbai

Excel Industries Ltd. has developed Organic Waste Converter (OWC) System, which can reduce bioconversion time-cycle to 10 days. Please visit www.excelind.co.in/cat.htm for OWC brochure. Should you desire to implement the project for a community cluster or bulk waste generators, please send me further information about waste generation per day, site address & contact person details to enable me to coordinate further in this effort.

S. Vishwanath, Arghyam Trust & Rainwater Club, Bangalore

For a household/apartment level composting solution please take a look at the link below:

Daily Dump

<http://www.dailydump.org/>

Offers a range of products and services that help compost at home and also provides solutions and knowledge through an open source platform, aimed at making waste useful

Jyotsna Bapat, TERI, New Delhi

I am aware of my relative living in Pune city using vermicomposting of vegetable (household) wastes.

One of them uses a plastic bucket and sack to keep the earthworms moist and functional. Then she has a terrace garden where she has grown fruits and vegetables without soil. The other one has a whole group of neighbours who separate their waste into bio degradable and recyclable. The 'green' waste is used for the common public greens. Both these are upper middle class localities and highly educated people.

I am not so sure it will work where it is needed the most in slums and crowded apartment buildings. We tried in Delhi with very limited success.

R. Santhanam, Indian Society of Agribusiness Professionals (ISAP), New Delhi

I have been from 1999-2000 onwards studying this problem and the variety of solutions being offered by different technology protagonists. I put together a paper whose summary was that you segregate the toxics and recyclables into two broad streams and what is left of Municipal Solid Wastes (MSW) is then mostly organic bio solids.

Going by some appropriate technology articles, I concluded that methanation was the best answer. The left over slurry in the methane digester would be used as manure. It is comparatively free of pathogens and weed seeds but however not completely stabilise and tends

to be acidic. KVIC Gobargas (Biogas) dried slurry being sold in petrol pumps in 5kg retail packing in Delhi were used in experiments in my terrace garden. I found them to burn the plants and did not really stick on to the soil like a gel and readily disappeared which most probably meant that they broke down into gases on aerobic fermentation.

I continued with my secondary source research and later studied different composting methods. I found that Bio solid wastes of MSW were successfully stabilised using vermiculture technology, using Eisenia Foetida type of worms, in USA and Australia. Later Mr Gopal Sane (Samrudhhi) introduced me to Biosanitiser and my final version is already posted at: http://www.wesnetindia.org/fileadmin/newsletter_pdf/Aug06/Waste_Management.pdf (Size: 231 KB)

Effective Management of Solid and Liquid Wastes

Abstract: Waste management needs to be holistic and must adopt an approach that is closer to nature to bring about multi fold benefits. Waste management techniques need to be revisited and modified to suit present day's complexities to avoid entry of toxic wastes into the environment, which are being increasingly produced at homes and other establishments. Treatment of waste generated at household, farms and other biological waste generating sources must include segregation, methanation and stabilisation along with the use of Biosanitisers to treat waste in a holistic manner.

I have added Dr A.D Karve's Compact Biodigestor to treat spoilt food materials like grains etc. in the sequence and process flow, which is different for different types of bio solid wastes.

Refer <http://www.bioenergylists.org/en/compactbiogas>. As mentioned in the article, uniform substrates like animal and human excreta are easily amenable for fermentation using mesogenic bacterium and hence conventional bio gas Digestors are better suited for this application.

The whole process should be standardised and will hopefully become applicable to the mountains of wastes accumulating in metros and smaller cities alike.

As this discussion thread suggest, agriculture stands to gain substantially if well stabilised bio solids are applied as soil humectants to our dryland agricultural soils. It would be socially, economically and environmentally the best possible choice as a "Holistic" approach, which can also be, viewed as a methodology whose sum of individual benefits is greater than the mere arithmetical addition. It fulfils the Triple Bottom Line needs very well.

Members may like to refer my response in the Consolidated Reply issued earlier on the Use of Human Excreta for Agriculture for more inputs on techniques used to manage wastes

[Use of Human Excreta for Agriculture](#) Nivedita Varshneya, German Agro Action/Deutsche Welthungerhilfe (DWHH/GAA), New Delhi (Experiences). Cross Posted between Water Community and Food & Nutrition Security Community. Issued on 30 September 2007.

Informs of various ongoing practices and emerging technologies for use of human excreta for agriculture, outlines risks and precautions in handling such waste and suggests mechanisms for an integrated operational approach

Many thanks to all who contributed to this query!

If you have further information to share on this topic, please send it to Solution Exchange for the Water Community in India at se-wes@solutionexchange-un.net.in and/or Solution Exchange for the Food and Nutrition Security Community in India at se-food@solutionexchange-un.net.in with the subject heading "Re: [se-watr][se-food] Query: Urban Waste Composting Methods and Uses for Agriculture - Experiences; Examples. Additional Reply."

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