



2013

# Waste Management



Govardhan Eco Village

1/20/2013



# Purpose

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## Objective

The objective is to show case the advantages gained in having an integrated development model for a village with respect to waste recovery and management.

At Govardhan Eco Village (GEV), the philosophy is that Nature provides for all our needs and if our lifestyle is in sync with the Nature then nothing in either the production or consumption cycles will be a waste. In other words, *what comes from Nature in one form goes back to its proper place in Nature in a different form* after being processed and used. The waste material for one particular process will be a raw material for another process. At GEV we have tried to establish several traditional and innovative techniques by which Waste Management rather than being a headache or hazard can become an added advantage. This document presents the various techniques in which waste is recycled or reused in various activities of the village.

In turn, the waste can also be overturned into costs savings if planned carefully. This case study will also endeavor to present the same.

## Link to core concept

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Govardhan Eco Village (GEV) is a humble attempt to highlight the importance of living in harmony with nature and using the gifts that Nature and God have bestowed upon us to serve the society by setting up a model farm community. Our aim is to develop farm communities as they present the only sustainable way of leading a life which is physically, mentally, socially, economically, spiritually and environmentally friendly.

Managing waste plays a key role in completing a sustainability model in definition. One may even lead a 100% organic life, but there is bound to be waste – organic as well as inorganic – left over. Modern civil systems have taught us to transfer this burden to another location – as in landfills; or another medium – as in rivers/sea. Through



thorough research we have created a system of not only reducing ecological costs by retaining 99% of our wastes, but also help in bring down various economic costs.

## The Process

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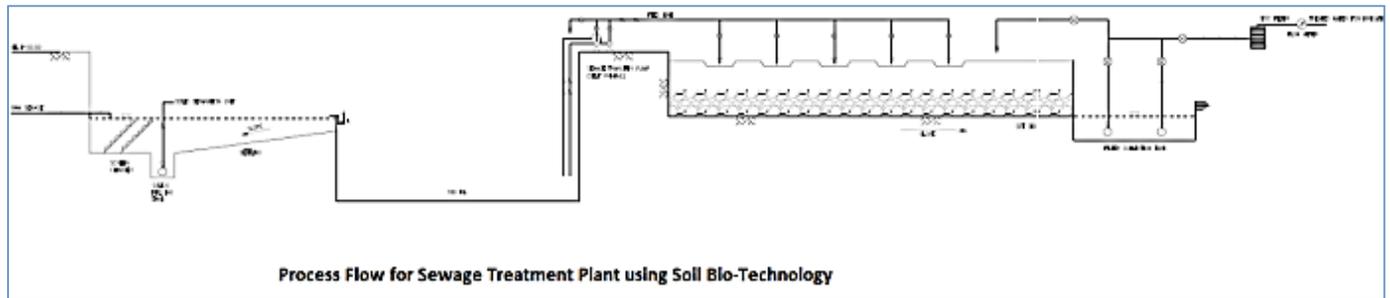
At GEV, we have tried a combination of time tested traditional techniques as well as indigenous innovations to develop a Symbiotic Model of Waste Management. Govardhan Eco village is an integration of various individual systems comprising of organic farming, goshala, biogas plant, and green constructions etc., which facilitate recycling or reusing of waste from one system into other.

### **Bio-gas plant (Symbiosis of Kitchen, Food Waste and Agriculture)**

Cattle waste is converted into biogas, to be used as a fuel for cooking. The Biogas plant also takes kitchen wastes like cooked rice to produce Biogas. The slurry produced after extraction of gas is utilized as a natural fertilizer in organic farming. Currently we have two biogas plants

### **Soil Biotechnology (SBT) (Symbiosis of Human Waste & Agriculture)**

Water is an excellent medium for transfer, owing to its ability to flow and carry solid matter with it. That solves the issues about waste collection, but it creates a problem with waste treatment. Water is not the best medium to decompose matter. However, research by one of our researchers, Dr. Biplab Patanaik at IITB showed that Soil is an excellent natural medium for decomposing solid wastes. His breakthrough research at IITB showed that the best sewage treatment system would be an integration of these systems – **A system that uses water as a medium for waste collection and soil as a medium for waste treatment.** Such a system would consume little energy and would integrate in a seamless manner with the natural cycles of environment.



We invite you to read the case study focused on Soil Bio technology

### **Construction waste (Symbiosis of Construction & Agriculture)**

Construction wastes like broken cement poles and bricks are utilized in making permanent raised beds (PRB) for farming. The PRBs are an innovative way of saving human labor, tractor usage, energy and time, before cultivation. The land is prepared by creating these raised beds from cow manure, leaves compost and soil. These beds are permanent and are more fertile and conducive for growing vegetables and fruits. GEV was recently listed among the top 100 agricultural innovators for effective usage of PRBs.



The entire boundary of the PRB is made by construction wastes like cement poles and bricks. Other construction wastes like quarry dust was used an aggregate in cob house construction and in repairing the roads. The broken red bricks are being used in water proofing the roofs in other constructions.



### Card board and Cloth (Symbiosis of Community Waste and Agriculture)

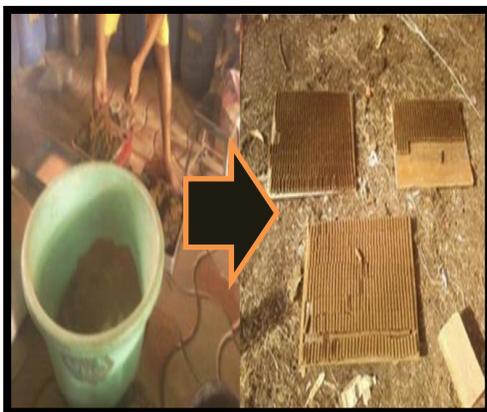
Waste card board cartons and cloth are used as mulch in the agriculture field.

Mulch is a protective cover placed over the soil to retain moisture, reduce erosion and provide nutrients. Spreading the waste card board cartons and cloth on the land also blocks sunlight, thus preventing growth of any weeds. By

using this simple technique one can avoid the labor intensive task of removing weeds or usage of any chemical weedicides.

### Plastic bags

Cement Bags and other plastic bags are utilized to store mud and compost. It is also used to grow plants, esp. grasses like *kusha* – whose roots can be easily extracted by cutting the bag open. Also cement bags are used for storing food wastes to convert them into manure.



### Wood dust

Wood dust is produced by sawing the wood used for construction of various buildings in the village. It forms an ingredient along with cow dung, in making of *dhoop* sticks or chemical free incense sticks. Not only are these *dhoop* sticks fragrant, but also have the utility of being a chemical free mosquito repellent. The picture shows wood dust

(in tub on left) being converted into *dhoop* sticks (right).



## Mobilizing multiple stakeholders

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Initiative	Stakeholder mobilized	Exchange
<b>Soil Bio Technology</b>	Indian Institute of Technology, Bombay	They gave us technical knowhow whereas we offered a platform to them for testing and installing the technology.
<b>Bio Gas Plant</b>	Mid-Day Meal kitchens	We became consumers for their food waste and relieved them from burden of food waste management.
<b>Agriculture</b>	Local farmers	Teaching them know how of using commonly available organic wastes to be used as fertilizers. This way we add to the ecological balance in the surrounding areas as well.
<b>Schools</b>	Students	Educating them on ways they can re-use waste at home.

In all these different initiatives we have been successful in teaming with different individuals and groups to arrive at a more and more refined Waste Management Systems.

## Impact and Sustainability

Monthly Savings and Revenue		
1	Number of LPG cylinders saved per month	50
2	Amount saved per month on LPG cylinders (Cost of cylinder is Rs. 1150)	Rs. 57,500
3	Savings from Slurry per Month (Or market value of raw materials, saved)	Rs. 13,500
4	LPG procurement costs (For shuttling between Wada town and farm)	Rs. 2000
5	Amount saved on Fuel per month	Rs. 2000
6	<b>Total savings and revenue</b>	<b>Rs. 75,000</b>
Monthly Cost Incurred		
1	Salary for 1 person	Rs. 5600
2	Maintenance cost	Rs. 4000
3	Fuel Cost per month	Rs. 6000
4	Diesel cost per month for running the pulverizer and blower	Rs. 3000
5	<b>Total Cost incurred</b>	<b>Rs. 18,600</b>
Net Savings per month		
1	<b>Net Savings per month</b>	<b>Rs. 56,400</b>

### Value creation by SBT

Output	Values
<b>Irrigation water generated/ day</b>	20,000-30,000 ltr/day. This also saves Rs.35000 Approx. per annum.
<b>Bio-fertilizer produced in SBT</b>	2 Metric Tons/annum



### Comparison of the Water Quality before and after SBT Treatment

Sr.No.	Test	Raw sewage Water	Treated SBT Water	Permissible Limits
1	pH	7.61	8.1	55.- 9
2	COD	184	8	250 Max
3	BOD, 27C 3days	38	3.6	100 Max
4	Total Suspended Solids	68	14	100 Max
5	Oil & Grease	2	<0.1	10 Max
6	Total Dissolved Solids	460	766	2100 Max

Sample Analysed By	Sachin Gaonkar	Sample Analysed On	10/03/2012
Sample Description	Raw Sewage Water Sample from Govardhan Eco Village, Galtare Post : Hamrapur, Taluka : Wada, Dist : Thane.		
Standard Specifications	---		

Parameters	Units	Test Results	Methods
pH	---	7.61	APHA 4500 H <sup>+</sup>
COD	mg/ltr	184	APHA 5220 B
BOD 3 days 27°C	mg/ltr	38	APHA 5210 B
Total Suspended Solids	mg/ltr	68	APHA 2540 D
Oil & Grease	mg/ltr	2	APHA 5520 B
Total Dissolved Solids	mg/ltr	460	APHA 2540 C

For GADARK LAB PVT. LTD.

**Analysis of Sewage**

 <b>GADARK LAB PVT. LTD.</b> INDUSTRIAL ANALYSTS & CONSULTANTS <small>LAB: H-54, Additional M.I.D.C. Kurla, Taluka - Kurla, District - Sionburg - 415 525          Tel.: (02342) 223519 • email: info@gadark.in / gadarklab@vsnl.com          OFF: 15, Hindustan Kohinoor Industrial Complex, B.S. Marg, Viharoli (West) Mumbai - 43          Tel No. : 022-2577 7099 / 70 • Fax : 022-2577 4545.</small>			
<b>TEST CERTIFICATE</b>			
Report No.	GPWEW/03112/12	Report Date	22/03/2012
Organisation	M/S. LIFE LINK ECO TECHNOLOGY PVT. LTD. OPP. IIT MARKET, POWAJ, MUMBAI - 400 076		
Lab Reference No.	1203-1502		
Your Letter No.	---		
Sample Collected By	Party	Date of Sample Received	15/03/2012
Sample Analysed By	Sachin Gaonkar	Sample Analysed On	16/03/2012
Sample Description	Treated Sewage Water Sample from Govardhan Eco Village, Galtare Post : Hamrapur, Taluka : Wada, Dist : Thane.		
Standard Specifications	M.P.C.B. Limits		

Parameters	Units	Test Results	Standard Specifications	Methods
pH	---	8.10	5.5 To 9.0	APHA 4500 H <sup>+</sup>
COD	mg/ltr	8	250 Max.	APHA 5220 B
BOD 3 days 27°C	mg/ltr	3.6	100 Max.	APHA 5210 B
Total Suspended Solids	mg/ltr	14	100 Max.	APHA 2540 D
Oil & Grease	mg/ltr	< 0.1	10 Max.	APHA 5520 B
Total Dissolved Solids	mg/ltr	766	2100 Max.	APHA 2540 C

For GADARK LAB PVT. LTD.

**Analysis of processed water**