

Bears Breaking Boundaries

Proposal in Green Cities and Open Ideas categories by:

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Deep Fields Organic Farmers Co-operative

This project proposal stems from our desire to initiate a program that is financially viable, ecologically sustainable, and socially conscious. We firmly believe that ideas that we propose must be a complete cycle of events rather than discrete units of action.

Motivation for the Plan:

- Improper garbage disposal in Indian cities,
- To encourage separation of garbage at source and promote a sense of social responsibility towards proper disposal of garbage,
- Improve living standard and working conditions of garbage collectors,
- Provide an impetus for organic farming,
- Provide increased and assured income for farmers,
- Provide respite for small retailers from the onslaught of international giants.

Existing garbage disposal scenario:

In most Indian cities garbage disposal is a perennial problem. Some municipal corporations have invited private enterprise in this sector, but problems persist due to disposal problems compounded since waste is not separated at site.

According to studies conducted by The Energy and Resources Institute (TERI), in 1947 cities and towns in India generated an estimated 6 million tonnes of solid waste, while in 1997 it was about 48 million tonnes. Of this more than 25% of the municipal solid waste is not collected at all; 70% of the Indian cities lack adequate capacity to transport it or landfills to dispose of it.¹

1. Accessed from www.teri.res.in/teriin/camps/newslet/issue4.pdf on 03.28.07

Even if this were available, landfills are always a temporary solution and end up polluting the groundwater and soil of the region. In an effort to look for alternate solutions the large cities like Mumbai and New Delhi have signed MoUs to use incinerator-based waste disposal technologies now being phased out in Europe and the US.²

These methods prove to be unsustainable in the long run even though they are expected to generate some amount of energy by burning the garbage. According to Almitra Patel, who heads a committee on solid waste appointed by the Supreme Court of India in 2000, “After one deducts the energy needed to pre-sort wastes, operate a plant, dry the digester slurry, treat the effluent and transport the wastes off-site, a Municipal Waste To Energy unit may well consume more energy than it produces.”³

At present in most cities in India, garbage disposal is undertaken by low wage employees who collect garbage door to door. Of the garbage produced by a typical household about 0.8 kg per day is organic waste that is suitable for composting.⁴ Unfortunately the garbage is rarely separated at source and the garbage collectors work in appalling unsanitary conditions.

Condition of small scale farmers:

Most cities in India have villages surrounding it with these villages supporting small scale farmers. As farming proves less lucrative migration to urban areas accelerates leading to the creation of squatter settlements and increased pressure on the already strained urban infrastructure.

In most cases the produce of these small scale farmers are consumed by the neighbouring cities. But numerous problems ail small scale farmers, right from lack of access to an assured market, lack of proper information about better farming practices, lack of supportive financial structures in the event of crop failure etc. Some of these issues are being solved by various agencies through schemes like the ITC *e-choupal*⁵ (which provides up-to-date information about prices, farming technology etc to agrarian communities through implementation of rural information technology schemes), other micro financing schemes and financial support from ADB for small scale farmers.⁶ We have conceived our proposal as adding another dimension to these efforts for the advancement of agrarian communities.

2. Inter Press Service, February 22, 2007 Thursday, Keya Acharya, BANGALORE, February 22 2007

3. *ibid*

4. Accessed from www.eawag.ch/.../sandec/publikationen/publications_swm/downloads_swm/decentralised-Composting-in-India.pdf on 04.12.07

5. Accessed from http://www.itcportal.com/ruraldevp_philosophy/echoupal.htm on 04.15.07.

6. Japan Economic Newswire, December 11, 2006 Monday 9:16 AM GMT, , INTERNATIONAL NEWS, 173 words, MANILA Dec. 11

Opportunities:

The issue of urban waste management, and the poverty and instability of rural agrarian communities have often been dealt with as separate problems. But there seems to be an opportunity to link the two and put in a cycle of events which would alleviate both the problems to some extent. One such opportunity is the possibility of collecting organic kitchen waste and converting it to compost for the use of organic farmers.

According to a study done in Taiwan, Officials from the Bureau of Environmental Inspection estimated that some NT\$2.4 billion can be generated annually simply by collecting kitchen waste and making it into compost, in their country.⁷ This provides an example of the possible scope of such a scheme in a country like India.

According to studies by Schumacher Center for Technology and Development, UK, such a system is especially feasible in developing countries considering the substantially large proportion of vegetable matter in municipal waste. (Appendix 1).

For initiating the Deep Fields program we have identified the twin cities of Hubli-Dharwad in Karnataka which has thriving peri-urban agricultural community. According to research done by F.Nunan at the School of Public Policy, University of Birmingham, the Hubli-Dharwad twin cities have a population of approximately 800,000 and has an active agricultural community in the neighboring regions which uses urban organic waste for compost and recycled water for its irrigation needs.⁸

Proposed solution in brief:

We propose to start an organic farmer's co-operative which will deal with the collection of organic waste from the cities, convert it to compost, distribute it amongst farmers, and collect and market their produce in the cities.

In brief the proposal consists of the following steps:

1. Utilize urban organic waste for generating compost.
2. Promote organic farming of fruits and vegetables using this compost, in villages near urban centers
3. Set up a viable model of distributing the produce to small scale retail units in the cities.
4. Set up a points system by which the citizens who contribute organic waste get discounts on their shopping at these small scale retail units.
5. Urban waste that is generated enters the above described cycle once again.

7. Central News Agency - Taiwan, November 27, 2006 Monday 1:06 PM TST, Deborah Kuo, Taipei, Nov. 27

8. **Nunan, F.** Urban organic waste markets: Responding to change in Hubli-Dharwad India.2000. *Habitat International*, 24(3), pp 347-360.

Detailed sequence of events:

A co-operative of farmers needs to be set up in order to initiate and co-ordinate this chain of events. The governance model of the co-operative is illustrated in Appendix 2.

1. At a neighborhood level the representatives of Deep Fields would inform the residents about the Deep Fields scheme and the level of garbage segregation that would be required from the residents. The program aims to achieve segregation of organic waste that can be used for composting from other waste generated by the household. The residents have a clear incentive for doing this since it entitles them to the discount scheme through the local retail stores that are also members of the Deep Fields program.

2. The discount scheme would be based on a system of points accrued which depends on weight of segregated organic waste contributed. A discount card/coupon system would be followed, which can be used during their shopping trips to the local small scale retail stores. The garbage collector would be required to weigh the segregated organic waste that is collected and enter it in the homeowners discount coupon. At the end of one month it can be totaled and the amount of organic matter contributed to the Deep Fields program for that month would decide the discount level or category that the homeowner qualifies for in the next month of shopping.

3. The neighborhood level representative of Deep Fields shall work with the garbage collectors in educating them about hygienic methods of garbage collection and ways of keeping the garbage segregated. The implements for this like sacks gloves, shovels, bicycle trolleys etc would be a one time investment on the part of the farmers co-operative.

4. The organic waste suitable for composting would be delivered by the garbage collectors to the neighborhood collection centers of the co-operative. Some space would be required for composting at the neighborhood level and locating this in neighborhoods would be an initial challenge that would have to be solved with the co operation of the Residents Welfare Association of the area. Apart from residential households, organic waste suitable for composting can also be collected from vegetable markets in the cities, larger office and industrial complexes etc.

Garbage that is unsuitable for composting would go to the municipal authorities, but even this system ensures partial segregation of garbage at source and reduces the strain on the municipal system of garbage disposal. This reduced load on the municipal garbage disposal system should ideally result in reduced municipal taxes for the members of the Deep Fields program.

5. At these neighborhood collection centers, the neighborhood level representative of Deep Fields shall be responsible for the composting process which would provide additional employment to the garbage collectors. This decentralized mode of composting avoids unnecessary transportation of garbage over long distance and instead only the compost needs to be taken to the Rural Distribution Centers. This transportation can be carried out in small trucks operating on efficient compressed natural gas engines.

6. The rural distribution center will perform multiple functions.
 - a. Additional compost processing would be carried out, providing employment to the villagers.
 - b. compost distribution centers for local farmers.
 - c. the farmers can deliver their produce to the co-operative at this location, and be compensated for them with both compost and cash.
 - d. The produce is taken to the urban retailers from this rural center.

7. The rural distribution centers will work as the single window for the farmer to collect manure and to sell his produce for cash and more compost. This automatically eliminates middlemen involved in both the sale of compost to farmers and in the sale of produce to the urban retailers. The distribution centers will also cater to other needs of the farming community including, equipment and other manure that may be necessary for different crops.

8. The produce is transported and sold to the small scale urban retailers when the delivery trucks of the co-operative make their return run to the cities. These urban retailers would also be members of the Deep Fields program and the neighborhood representatives of Deep Fields will have to work with them to clarify the discount scheme which works as described below.

9. When a resident who is a Deep Fields program member does his/her shopping at the retail outlet, they would receive a discount based on the value of Deep Fields produce that the purchase. But the discount will be calculated on the overall value of their purchase so as to encourage them to do the rest of their shopping also at the same retailer. This ensures two things :
 - a. The Deep Fields members have a clear incentive to buy the Deep Fields produce.
 - b. The shopowner also has a clear incentive to be a member of Deep Fields and give a discount on the overall purchase since the shopowner is gaining a loyal client for all his goods in the process.

10. The cycle continues when the garbage generated is once again separated at source by the residents and handed over to the garbage collectors.

Proposed methods of composting:

Based on initial research, aerobic composting seems to be the ideal method for converting the organic waste to compost. In this case bacteria and fungi which thrive in high oxygen conditions are responsible for the decomposition and these do not cause unpleasant odors.⁹

At the neighborhood level aerated bin technology would be used for the preliminary composting. Further composting can be achieved at the rural distribution centers through the process of co-composting in which cow dung which is readily available in the village would be mixed with the compost in order to further enrich it.¹⁰

Future Enhancements:

Once the program has been successfully initiated, Deep Fields could also explore possibilities of entering other areas of recycled products, processing of the organic produce cultivated at the villages and also energy production from waste at the rural scale, like bio gas and methane.

Proposal for Utilization of initial funding:

We propose to use any initial funding obtained for doing the preliminary research work in order to start the pilot project in the Hubli-Dharwad region. The research would be primarily required in the areas of establishing the best composting strategies adapted to local conditions, meeting local regulations and municipal laws, discussions with the farmers and researching their requirement and expectations from a scheme like this. Once this initial phase of research is completed, funding would be used for starting the educational and training programs for the garbage collectors, door to door communication of program intent in cities, and for training people from villages to manage the rural distribution centers and take over the reins of the various levels of the co-operative system.

Team Biography:

Krishna Balakrishnan completed his undergraduation in Architecture from the School of Planning and Architecture New Delhi and worked as an architect in India for three years before joining the Master of Landscape Architecture program at UC Berkeley.

Ganesh Mohan completed his undergraduation in Electronics and Communication Engineering from the Cochin University of Science and Technology and holds an MBA in Marketing and Systems from Indian Institute of Technology, Chennai.

Both team members hail from the city of Trivandrum, capital of the southern Indian state of Kerala.

9. Accessed from http://practicalaction.org/practicalanswers/product_info.php?cPath=&products_id=181 on 04.15.07.

10. *ibid.*

Appendix 1:

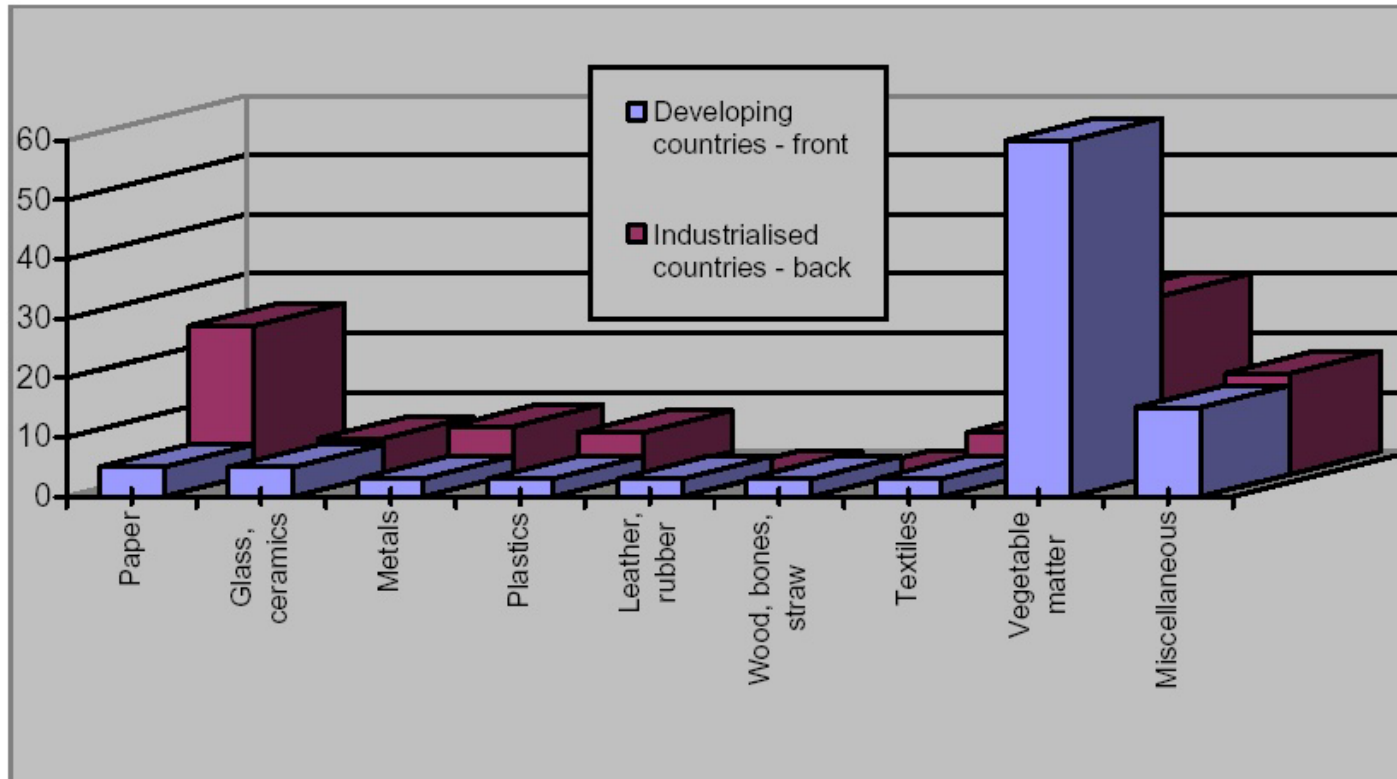
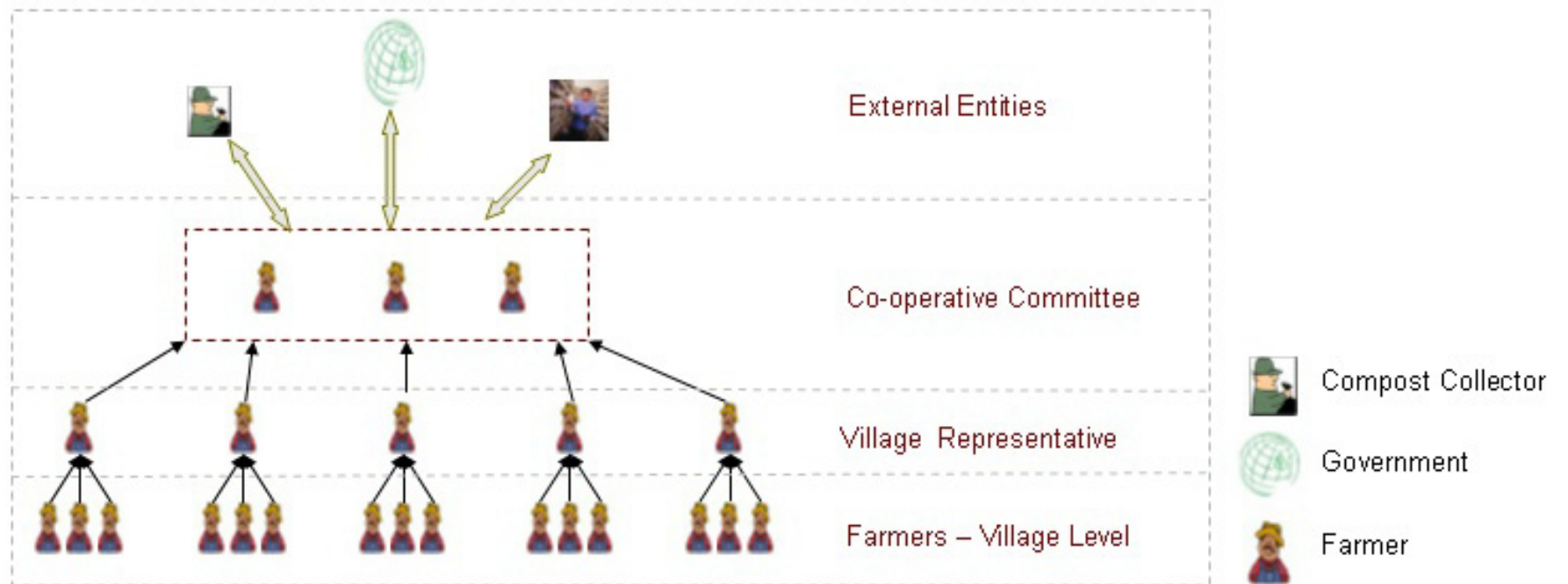


Figure 1: Composition of municipal waste in a typical developing and industrialised country (actual figures vary significantly – this figure is only an example).

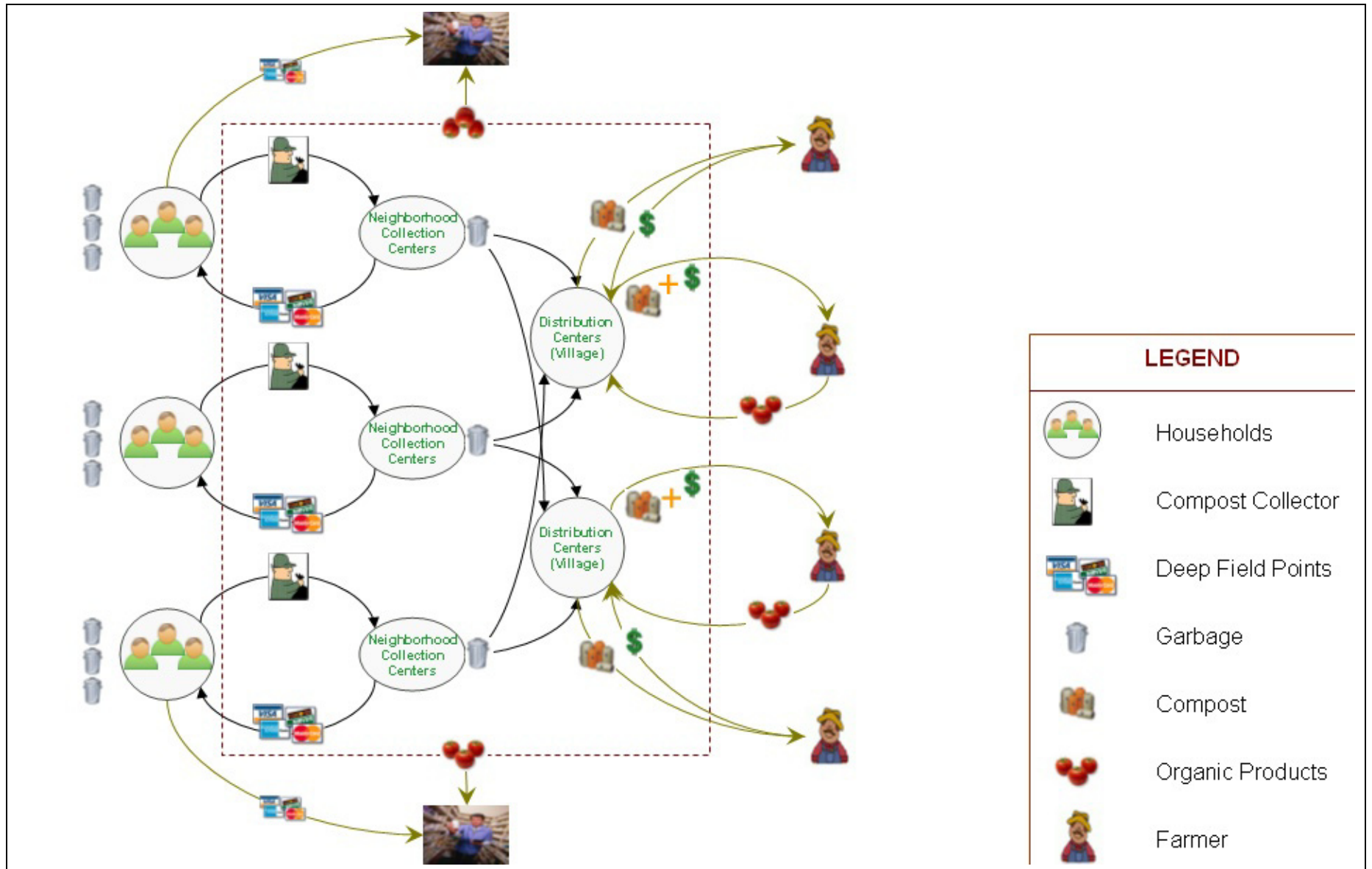
Source: The Schumacher Center for Technology and Development, Warwickshire, UK.

Accessed from http://practicalaction.org/practicalanswers/product_info.php?cPath=&products_id=181 on 04.15.07.

Appendix 2: Governance model for the Deep Fields organic farmers co-operative.



Appendix 3: Flow of events



Appendix 4: Value Chain Analysis.

| | | | | | | |
|--|--|--|---|---|--|--|
| S U P P O R T | Infrastructure | General Mgmt, Cost Accounting, Financial Accounting, Financial Reporting, Mgmt Reporting, Govt Reporting, Planning, Public Relations, Regulatory Compliance, IT & Communication, Financial Mgmt, Cash Mgmt, Product Profitability | | | | |
| | HR Mgmt | Personnel Requirements, Manage Personnel, Training, Mgmt Development | | | | |
| | Technology Development | Integrated Information systems, Product R&D, Automation | | | | |
| | Procurement | Collection logistics (Garbage and vegetables), Garbage Segregation | | | | |
| PRIMARY ACTIVITIES | Collection of Garbage, | Collection and Packaging of compost | Finished product inventory | Positioning | Household training | |
| | Procure Vegetables | Selling manure | Quality assurance | Branding | Respond to queries | |
| | Quality control | Processing and packaging of organic products | Packaging | Advertising | Organic products awareness programs (farmers and end customers) | |
| | Warehousing | Branding and distribution of organic vegetables | Customer (Farmer, Retailer) order processing and control | Sales promotion | Product replacement guarantee | |
| | Delivery to processing and packing line | Dissemination of information | Transportation | Direct selling | | |
| | | | | Participation in trade fairs and international exhibitions | | |
| | <i>Inbound Logistics</i> | <i>Operations</i> | <i>Outbound Logistics</i> | <i>Marketing & Sales</i> | <i>Service</i> | |

Appendix 5: Benefits of implementing the Deep Fields plan

| | |
|--|---|
| <p>Society</p>  | <ul style="list-style-type: none">❖ Products at subsidized rates❖ Access to high quality organic food❖ Cleaner environment❖ Lesser municipal corporation tax |
| <p>Retail Outlets</p>  | <ul style="list-style-type: none">❖ Increased customer base❖ Sustained Supply of Products❖ Improved image in society |
| <p>Farmer</p>  | <ul style="list-style-type: none">❖ Easy access to organic Manure❖ Less irregularities in the market❖ Assurance in income |
| <p>Government</p>  | <ul style="list-style-type: none">❖ Lesser efforts in getting rid of garbage❖ Savings on budget❖ Positive impact on environment |

Appendix 6: SWOT Analysis

| Strength | Weakness |
|--|--|
| <ul style="list-style-type: none"> ❖ Robust business plan with all-round beneficiaries ❖ Raw material inputs cheap and easily available ❖ Run by cooperative society which has the farmers interest as priority ❖ Elimination of intermediaries makes the whole flow transparent and passes on the benefits to the grass root level. | <ul style="list-style-type: none"> ❖ Imitable ❖ Dependant on steady supply of Garbage ❖ Complexities involved getting organic certifications. ❖ Land requirement at the neighborhood level for decentralized composting, though minimal will be a challenge to meet. |
| Opportunity | Threat |
| <ul style="list-style-type: none"> ❖ Increased demand for organic produce in cities ❖ Employment opportunities created is huge. ❖ Improvement in all round standard of living. | <ul style="list-style-type: none"> ❖ Government policies ❖ Environmental hazards involved in storing of garbage before processing. ❖ Misuse of system – Farmers turning in ordinary vegetables claiming them to be organic. |

Appendix 7: Information used for cash flow calculations

| | |
|---|--------|
| Organic waste generated per household per day (in Kg) | 0.8 |
| No of houses handled by each rag picker per day | 160 |
| No of houses to be targeted | 10000 |
| Employees at the Neighborhood collection Center. | 2 |
| Total No of Rag pickers to be employed | 65 |
| Salary paid to each rag picker | 500 |
| total waste production in a month | 240000 |
| Total compost production in a month(in Kg) | 72000 |
| Selling price Composte per kg | 2 |
| no of villages | 3 |
| Number of staff needed at Rural Distribution Center | 3 |
| Salary per Rural Distribution Center staff | 800 |
| Rent of Rural Distribution Center | 1500 |
| total people employed at Rural Distribution Center | 9 |
| amount paid to household per kg of waste (Rs) | 2 |
| Amount to be paid back to one households in the form of points redeemed | 48 |

| | |
|---|------|
| Capacity of one truck for transporting to Neighborhood collection Center (in kg) | 8000 |
| Distance to be travelled (in km) | 50 |
| Cost per km of travel(in Rs) | 7 |

| | |
|---|-------|
| qty of tomatoes consumer by each household per month (kg) | 8 |
| Assuming price of organic tomato from farmer per kilo | 25 |
| Selling price of Organic tomato in the market per kilo | 30.25 |
| certification per village (Rs) | 46704 |

Appendix 8: Sample calculation based on cultivation of tomatoes

| Expenses | Rupees | Income | Rupees |
|--|-----------------|--------------------------------|----------|
| | | Sales of tomatoes | 29040000 |
| | | Total Selling price of compost | 1728000 |
| | | Total Income | 30768000 |
| Equipment Costs | 300000 | | |
| total cost of certification for 3 villages | 140112 | | |
| Total fixed Cost | 440112 | | |
| Variable Cost (per year) | | | |
| Amount paid to farmers for produce | 24000000 | | |
| Salary and wages | | | |
| Total cost of employing rag pickers | 387000 | | |
| Salary paid to community Organizer | 36000 | | |
| Total salary for Rural Distribution Center. | 86400 | | |
| Rents | | | |
| total rent for Rural Distribution Center. | 54000 | | |
| Land rent for 1 Neighborhood collection Center. | 60000 | | |
| Packing and distribution | | | |
| Cost of packing | 86400 | | |
| Miscellaneous expenses | | | |
| amount of manure given to farmer(can be used for funding part of money given to household) | 1728000 | | |
| Amount to be paid to households as points redeemed | 5760000 | | |
| Total cost for transportation(to Neighborhood collection Center.) | 37800 | | |
| Total Variable Cost | 32235600 | | |
| Total Cost | 32675712 | | |

Appendix 10: Other criteria used for generating these calculations:

1. Assuming 3 villages – each is equidistant from the Neighborhood collection Center (assuming 50 km total distance). The total compost will be distributed equally between the villages.
2. Assuming only 1 Regional collection center is required at the moment
3. 10,000 households will be included to start with. The scale of operations will be increased once the process is streamlined.
4. Each ragpicker will be given a trolley to carry the composte collected. So he will be able to service 160 households in a day assuming it takes 3 minutes to service one house and the rag pickers work for 8 hours per day
5. Assuming 30% of the total waste is converted to compost.
6. there is a Rural Distribution Center in every village -hence 3 Distribution(Since projections are done for three villages)
7. assuming a 30% profit margin ($sp = 1.3 * CP$)
8. the price at which the farmer gives includes his cost of production and packaging in cartons and a 21% profit margin for him.[here
9. When the manure is given to the farmer, a credit facility is extended to him and no immediate cash payment is taken for the manure.
When the farmer comes to sell his produce to the Distribution Centres, the cost of manure (which was given as credit)is deducted and the rest is paid to him. The credit extended is at 0% interest.
10. 50% of manure is sold to households and other NGOS or organizations willing to buy. The money generated from this will be used to extend credit to the farmers to maintain profitability and sustain the operations.
11. equipment (fixed cost) will involve compost bins, trolley given to each rag picker, uniform and accessories for rag picker.
12. Each Indian household consumes 8kg of tomatoes in a month on an average
13. Within-state fees: The basic producer fees are on a sliding scale based on the gross farm sales. For example, the basic certification fee for a small farm in its first year of certification with gross sales between \$5,000 and \$10,000 is \$434. A larger operation with sales between \$100,000 and \$125,000 would be charged a fee of \$1,112. A farm selling over \$500,000 worth of organic production would be charged \$2,517 plus 0.1% of total sales in excess of \$500,000. Re-certification in subsequent years costs about \$155 less for any operation, regardless of size.

So we require \$434 for certification of each village. The certification has to be renewed once in every 3 years.
14. We increase the number of houses covered by 5% pa.
15. each house produces 0.8 kg of waste per month
16. depreciating the equipment (including trolley, bins and other accessories) by 10% (straight line dep)
17. since we have uniform waste production in all households and uniform costs, we expect the operating expense to increase proportionately i.e. 5%