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**Integrating Solid Waste Management and Organic Farming:  
A Case of Kerala**

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## Table of Contents

Introduction.....	5
Research Methodology .....	5
Secondary Research: .....	5
Primary Research: .....	5
Organic Farming .....	6
Organic Farming in Kerala .....	6
Importance of Organic farming.....	6
Organic Advantage .....	6
Disadvantages of current system.....	8
Inference from Primary Research .....	8
Challenges faced by Organic farming in Kerala .....	9
Solid Waste Management .....	9
SWM in Kerala, Current Scenario: .....	9
Case of Trivandrum Corporation’s Private partnership with POABS .....	10
Contracting of SWM to NGOs.....	11
Key Challenges .....	11
Segregation of Waste at Source .....	11
Pollution in areas where Waste Processing Units are setup and Opposition from People.....	11
Proposed Model .....	11
Integration of Clean City with Organic farming movement in Kerala .....	11
Hub and Spoke Model .....	12
Key Benefits.....	14
Policy Requirements .....	15
Legislation for giving more subsidies for organic farming.....	15
Legislation or incentives to assure aggregation at Source .....	15
Conclusion .....	15
Reference .....	16
Appendix A: Summary of Interviews in Preliminary Research.....	17
In depth Interview with Organic Farmer and Leader Babu Sir (Duration: 3 hours).....	17
Expert Interview with Organic Farming Consultant: Mrs. Revathy: Director, INSPIRE (Duration 5 hours) .....	17
Purely organic Farmer (Mr. Jose Elanjimattam) (Duration 45 minutes) .....	18

A Farmer undertaking both Organic and Inorganic Methods in farming (Mr. Hussein) (Duration: 45 minutes) ..... 19

A farmer who reverted back from inorganic to organic farming: (Mr Ravindran) (Duration: 45 minutes) ..... 19

Interview with expert: Seed Research Institute, Calicut, (Duration 1 hour)..... 19



## Introduction

The paper discusses two key issues, Farming and Solid Waste Management, and tries to come up with a model which could address these two issues to some extent. We expect the same model to be effective in other parts of India as well.

1. Inorganic farming practices have led to deterioration of soil quality and hence return of farmers in the long run. It is proven through research that the fertilizer costs will increase for farmers with time, as the quality of soil deteriorates and demand more fertilizers. There is an organic farming movement going on to address the issue. The movement is restricted to a few farmers all over India, while the benefits are high. This is largely due to the perceived high initial costs associated with organic farming inputs like organic fertilizer and pesticides, and the unavailability of information regarding the organic farming practices.
2. Solid waste management is a critical issue in Kerala. Poor management of waste has led to pollution and contributed to emission of green house gases. One of the issues with waste management is the high cost associated with effectively no returns and non-cooperation from the people, for disposal and dumping.

The paper discusses the major challenges while addressing these two problems and tries to frame a model which can address them in a cost effective manner. A hub and spoke model for waste collection, processing and distribution of the processed manure to different farms around the processing center is designed. The effectiveness of the model, in addressing other issues related to solid waste management as well as organic farming is also discussed.

## Research Methodology

**Secondary Research:** As a part of the secondary research we have reviewed papers on organic farming and Solid Waste Management. Most of the research material was obtained from different websites of both government and other parties related to farming and Solid Waste Management. We tried to compare what is done globally, nationally and in Kerala in the two research subjects and looked for ideas which could be effectively implemented in Kerala.

### Primary Research:

**Organic Farming:** In primary research we conducted in depth interviews of farmers in and around Kozhikode and Wayanad. The farmers include both inorganic farmers and organic farmers. In order to get a perspective of the experts in the field we interviewed Mrs. Revathy, Director of INSPIRE (Institute of Pioneers for Rejuvenating Earth) which pioneers organic farming, Satguna Farms CEO, Mr. Krishna, who endorses inorganic farming and, a group of Scientists from 'Seed Research Institute, Calicut' to get an independent view on the issue.

**SWM:** We had an opportunity to talk with one of the councillors in the Trivandrum Municipality regarding the current system of waste disposal and related problems. We also talked to Kudumbasree units in Kozhikode and Trivandrum. We also got an opportunity to assist a group of professors in presenting our recommendations to the Kerala Ministry on SWM, when they came to IIM Kozhikode on 18<sup>th</sup> August, for MDP program.

## Organic Farming

### Organic Farming in Kerala

The paper “**Kerala State Organic Farming Policy, Strategy and Action Plan**” a paper released by the government of Kerala elucidates the harmful effects of “modern farming” in Kerala, the need for organic farming in Kerala and states 24 step strategy for the implementation of the same. On November 1, 2007, Kerala announced its plan to convert all of its cultivated land to organic farming within the next five years. In 2006-07 the area under organic farming in Kerala was 11141.54 ha.

In 2010-11, a programme to promote organic farming in 20 blocks was initiated by the government.. In the current year the programme is under progress focusing on food crops. There are a number of certified organic farmers in Kerala, those cultivating cash crops such as spices, tea, and coffee, mainly targeting export market and also non-certified organic farmers who focus on food crops and biodiversity. All of them, whether certified or not, focus clearly on soil health improvement. Kerala also has an accredited organic certifying agency catering to the needs of the farmers. Organic Bazaar in Thiruvananthapuram, Eco-shops in Thrissur and Kozhikode and, Jaiva Krishi Sevana Kendram in Kannur are some of the outlets in Kerala which sell organic food. Self-help groups of women are encouraged to undertake organic farming of vegetables in some Panchayats. It has also launched two brands, namely ‘Kerala Organic’ and ‘Kerala Naturals’ to market organic farm produces.

A state-wide intensive campaign on organic farming in the form of a popular movement: “Jaiva Keralam” was started by government. Even though the program was very promising it failed to deliver the desired results as it is clear from the area under organic farming in Kerala, which is still very low. It is evident from the interview with farmers that the need gap in terms of organic fertilizer and organic pesticides is not yet addressed by the government. So the farmers, even those who have the intent to move to organic farming find it difficult to do so. The initial decline in yield is not received well by many farmers, which result in them shifting back to inorganic means of farming. Similarly the farmers are largely unaware of the techniques used in organic farming, as the interview with Mrs. Revathy confirms the same. A summary of the in-depth interviews conducted by the team is given in Appendix.

On the positive side government has made use of social groups like ‘Kudumbasree’ for farming as well. ‘Harithashree’, is a program in which, ‘Kudumbasree’ members cultivate crops in government leased land, as a part of poverty eradication mission of Kerala. ‘Kudumbasree’ units are self help groups formed by women. An area of 25162.12 ha was cultivated under collective farming in Kerala in year 2009-10.

## Importance of Organic farming

### Organic Advantage

A paper by David Tilman in *Nature* 396 showed that not only was the yields of organic maize as high as those of maize grown with fertilizers & pesticides, but the soil quality in the organic fields improved dramatically. The **Food and Agriculture Organization reports at the International Conference on Organic Agriculture and Food Security 2007** framed its discussions within the overall food system paradox, with a view to describe how organic

agriculture could assist in a paradigm shift for food security. According to their research use of chemical agricultural inputs has been increasing in the last two decades but grain productivity keeps declining; They also go on to state that industrialized food systems have environmental and social costs that threaten food security (e.g. occupational deaths through pesticide poisoning, farmers suicides due to debts, loss of millions of jobs in rural areas). It gives the example of China where an increase in organically managed land from 342 000 ha in 2003 (0.28 percent of total land) to 978 000 ha in 2005, resulted in a 9 fold increase in the farmers income. To summarize these are the main advantages of organic farming:

**Soil Quality Improvement:** The crops along with the application of fertilizers had led to the overexploitation of soil. The so called Green Revolution, in a way ruined the physical properties of the soil, rendering them useless, even with application of more and more fertilizers. This is evident from the numerous cases in Orissa, Tamil Nadu. Organic farming practices had shown excellent capability in rejuvenation of soil whose physical properties are lost due to conventional farming. An NGO INSPIRE has already proved the capability of organic farming practices in rejuvenating soil through its activities in MP, Srilanka and many other parts of the world. It is proved through research that the soil under organic farming have higher water holding capacity, lower bulk density, higher microbial biomass carbon and nitrogen and higher soil respiration activities compared to the conventional farming. As far as India is concerned, this is the most useful aspect. In India, the reduction in the yield due to deterioration of soil fertility, and the resultant decrease in income of farmers have led to many farmer suicides. The rejuvenation of soil could be life saving for many farmers.

**Higher Income:** The income of farmers is expected to increase with adoption of organic farming despite the low productivity during the initial years of adoption. According to a study by Indian institute of soil science, despite the reduction in crop productivity by 9.2% (in the selected sample), organic farming provided higher net profit to farmers by 22.0% compared to conventional farming. The low productivity itself can be averted to some extent through adoption of proper organic farming practices according to the pioneers in this field. According to experts in organic farming, the appropriate organic farming practices will defer according to the climatic conditions and the soil conditions in each area. The national project on bio fertilizers confirms the increase in yield, if organic farming is done in a proper manner.

Crop	Increase in yield in %
Plantation	4
Fruit	7
Wheat and Sugar Cane	9
Millet and Vegetable	10
Fibre, spices and condiments	11
Oil seeds and flowers	14
Tobacco	15

**Water conservation:** As explained earlier use of fertilizers necessitates more water for agriculture. Thus organic farming can help conserve water.

**Healthier food:** As per the research conducted on nutritional value in America, organic food has 100% more good elements and 20% less bad elements to human body as compared to inorganic food.

**Reduces the cost of production:** Organic farmers use locally available resources and hence it results in reduction in cost to farmers.

**Reduces the carbon foot print:** Inorganic farming practice increase the carbon foot print, as it leads to emission of green house gases.

**Low incidence of pests:** The incidence of pest is relatively low in organic farming, as compared to inorganic farming. But during our primary research one of the key problems cited by the farmers, in doing organic farming is the unavailability of organic pesticides.

**High employment opportunities:** Organic farming requires higher man power than inorganic farming. This can lead to higher employment opportunities. It will also assure labour around the year, as the diversification and cropping practices in organic farming, promotes cultivation through out the year.

### Disadvantages of current system

Soils have physical, biological and chemical properties. The inorganic farming methods take care of only chemical properties that too limited to mostly NPK. Plants need 16 micro and 7 macro nutrients. The use of fertilizers like urea increases water storage by 7 times. As water stored in plant body increases immunity decreases. This necessitates the use of pesticides. The new crops were developed to address the excess water storage problem, which lead to externalities like no hay for cows to feed on. The inorganic farming practices are unsustainable and research has proven the same. This has caused problems to all stakeholders, whether its consumer's health, farmer's health, or the long term returns of farmers. The contamination of underground water is a serious threat, which is evident in certain parts of India like Punjab as well. All the mainstream institutions are now supporting only chemical farming. The increase in use of fertilizers is usually accompanied by an increase in the use of pesticides, which is expensive and harmful to all stakeholders. The only group which gets benefited by this is the corporate who manufacture these pesticides. The huge fertilizer subsidies amounting to Rs. 100000 crore goes directly to these corporate. (2500 Rs. Bag sold for 350 Rs. differences is subsidy). The organic farming practices though widely promoted in developed nations through subsidies and research is not promoted in India.

### Inference from Primary Research

(Refer Appendix A, for details on In-depth interviews)

1. The costs of inputs for organic farming is perceived to be very high by most of the farmers
2. There is lack of support from research and government, especially when it comes to organic pesticides
3. Organic farming is perceived as labor intensive, and hence not profitable in Kerala
4. Organic farming can be done by many means, and the methodology will depend on the soil.
5. There is a huge information gap, when it comes to various organic farming techniques. For e.g. certain farmers believed that cow dung is a prerequisite for organic farming
6. It is proved by experts in organic farming like INSPIRE that organic farming can be done at low cost with proper technique

7. To sell the produce as organic, the organic farmers need to get the certification from certification agencies, this is a long tedious process
8. The incentives provided by government to organic farmers in India are minimal compared to foreign countries
9. Even though many government policies are there, the implementation is not reaching out to farmers
10. The lack of organic manure as input, and lack of subsidies in the organic space is also cited as a reason for not undertaking organic farming

### **Challenges faced by Organic farming in Kerala**

1. Lack of availability of organic manure
2. Information gap in terms of techniques to be used in terms of organic farming
3. Lack of organic pesticides
4. Lack of support from government
5. Misconceptions about organic farming among farming community

### **Solid Waste Management**

#### **SWM in Kerala, Current Scenario:**

As if now the waste processing facility is available only in 3 corporations out of 5 in Kerala. The other corporations have land for waste dumping, but no facilities for processing or collection. In case of Municipalities the numbers are a bit more discouraging. Out of 53 Municipalities, only 17 have land and treatment facilities. While 33 have land for dumping, the rest neither has land nor treatment facilities. Of a total of 999 Village Panchayats, only 126 Village Panchayats have land for waste treatment. All facilities for waste treatment is available only in 7 panchayaths, while partial facilities are available in 105 Village Panchayats.

The waste collection and disposal employong self help groups, like 'Kudumbasree' is largely effective in cities of Kerala. The collection of waste is conducted in an effective manner by these groups. But they are not provided with sufficient protection, in terms of equipments for collecting and disposing waste, which is a cause of concern.

In Kerala the per capita generation of waste is relatively high compared to other parts of India, due to the higher per capita income, as well as difference in the consumption patterns. Earlier, people used to compost waste in households, which is decreasing now. Similarly e-waste is on the rise in Kerala now. Seggregation of waste at source a major issue, which inturn causes difficulty in processing as well as collection.

The sources of solid waste in Kerala, and the percentage contribution from each source is given below:

Sl.	Source	Percentage of Total
1	House Hold Waste	49
2	Hostels, Marriage Halls and Institutions	17
3	Shops & Markets	16
4	Street sweepings	9
5	Construction	6
6	Slaughter House, Hospitals	3

Malinya Mukta Kerala was launched on 1<sup>st</sup> November 2007 with a mission of Clean Kerala. If we consider the situation of waste management in Kerala, despite success in a few areas, there is considerable dissent among people especially those surrounding the waste processing centres. Efficient disposal and management of waste is still an issue in Kerala. To site an example, the Villappilsala plant in Trivandrum, despite being handed over to government by the private party is not functioning in a proper manner, the people surrounding the area are still protesting against it.



People near the Vilappilsala plant protesting for the closure of the plant. The air pollution and water pollution in the area is a serious threat to the health and well being of people living in that area.

After interacting with the ministers in Kerala during their visit to IIMK on 18<sup>th</sup> August, we found that one of the main issues sited in waste management was a suitable model for effective waste management. Even the Trivandrum mayor in a recent public statement has stated that decentralizing waste management could possibly solve the issue to some extent, as it will diversify the ill effects in a plant. In order to find out, what exactly is the issue behind the solid waste management in Kerala, we interacted with a few officials and had an opportunity to go through a few official documents on Vilappilsala plant. A summary of the study is given below.

#### **Case of Trivandrum Corporation's Private partnership with POABS**

In Kerala public private partnership was tried without much success by Thiruvananthapuram Municipal Corporation, in their Vilappilsala plant. The agreement to efficiently process 300MT of Municipal Solid Waste (MSW)/day was not done by POABS, the private company, which resulted in improper dumping of unprocessed waste in the premises. This led to complaint from the neighborhood about foul smell and contaminated discharge polluting local water bodies. While the company demanded compensation for the breach of contract by TMC for not delivering the guaranteed quantity of MSW every day, TMC accused POABS of inefficient operation of the plant,

and insufficient capacity, which is less than the guaranteed 300 MSW of the plant build by POABS. So the agreement was not renewed and the plant was taken over TMC. The failure of POABS was mainly attributed to the lower capacity of the plant, **difficulty in segregating and processing waste**, lack of technical knowhow of the operator which resulted in lower conversion efficiency, **uneven demand of organic manure and lack of space to store manure** which resulted in dumping of untreated waste and subsequent problems.

### **Contracting of SWM to NGOs**

The contracting of SWM to NGO was successfully employed by many Panchayaths in Kerala. The Mangalapay village panchayath in Kasargode, Chunakkara Village Panchayath in Alappuzha , Paravur Municipality, Alappuzha Municipality etc. are examples of the same. The model in Alappuzha municipality is particularly attractive as the setting up of common vermin composting units and the subsequent use of the organic manure for farming is an excellent model, which is scalable in many other regions in Kerala.

## **Key Challenges**

After the secondary research we concluded that there are two main issues in SWM in Kerala

### **Segregation of Waste at Source**

Segregation of waste at source means, the households or institutions which dispose of waste to corporation to Panchayath or Municipality should ideally separate both organic and inorganic waste and then dispose it in separate containers or covers. But this is not done by the users, which makes it difficult for the waste recycling units to recycle the waste.

### **Pollution in areas where Waste Processing Units are setup and Opposition from People**

If waste is effectively transported, processed and disposed off, there won't be a big issue related to pollution. But the difficulty in segregating the waste and then processing it causes delay in processing. This will result in decay of the waste and hence pollution. Another issue is when the waste is processed, and the manure cannot be sold off, due to low demand in the market. This forces the plant to stop its production. This can largely be attributed to the seasonal nature of demand requirements for manure, and the inability to transport large quantity of manure to selling points on time by the processing unit or firm.

## **Proposed Model**

### **Integration of Clean City with Organic farming movement in Kerala**

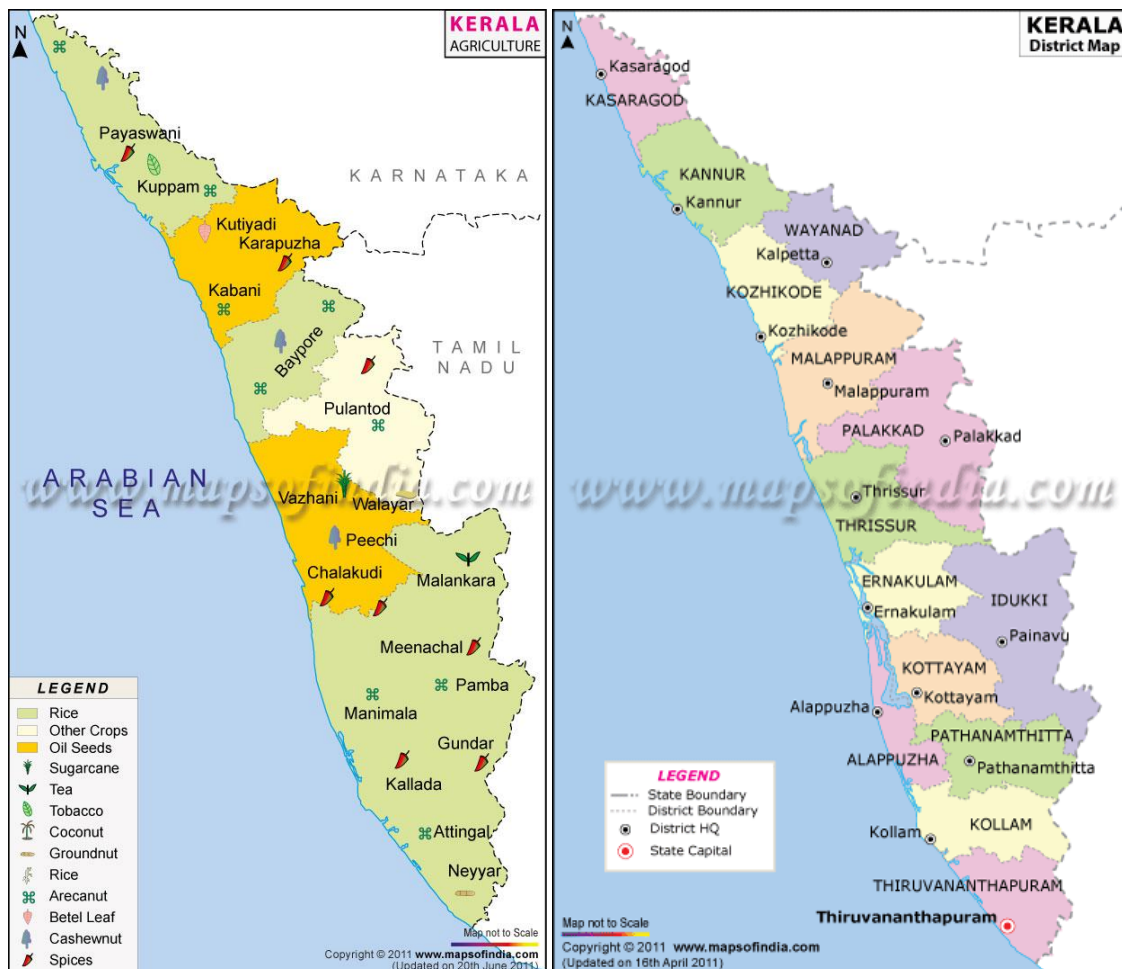
One of the key issues in organic farming is the difficulty in the procurement of organic manure and organic pesticides. Since the solid organic waste can be an input to Vermin Composts which could generate both organic manure and organic pesticides. The integration of the two policies seems to be a viable option. Considering the distribution of agricultural lands in Kerala (Refer Agricultural Map of Kerala), the following model is proposed. A hub and spoke model, with processing center as Hub and spokes for both procurement of waste from nearby areas as well as distribution of the processed manure to the nearby farms could help reduce cost for both collection and distribution. The Hub should be located in an area which minimizes the total distance between all the spokes. This could minimize the transportation costs, which forms a considerable part of both waste collection and manure distribution. The details of the model and implementation will be explained later.

In Kerala a large portion of the waste generated is biodegradable as explained in the table given below.

Sl.	Component	Percentage of Total
1	Biodegradable	71-83
2	Paper	3.5-5
3	Plastic, rubber, glass, metal	5.0-9.0
4	Inerts, earth, domestic hazardous	4.9-11.5

### Hub and Spoke Model

In Kerala, the agricultural land is uniformly distributed across districts as shown in figure.

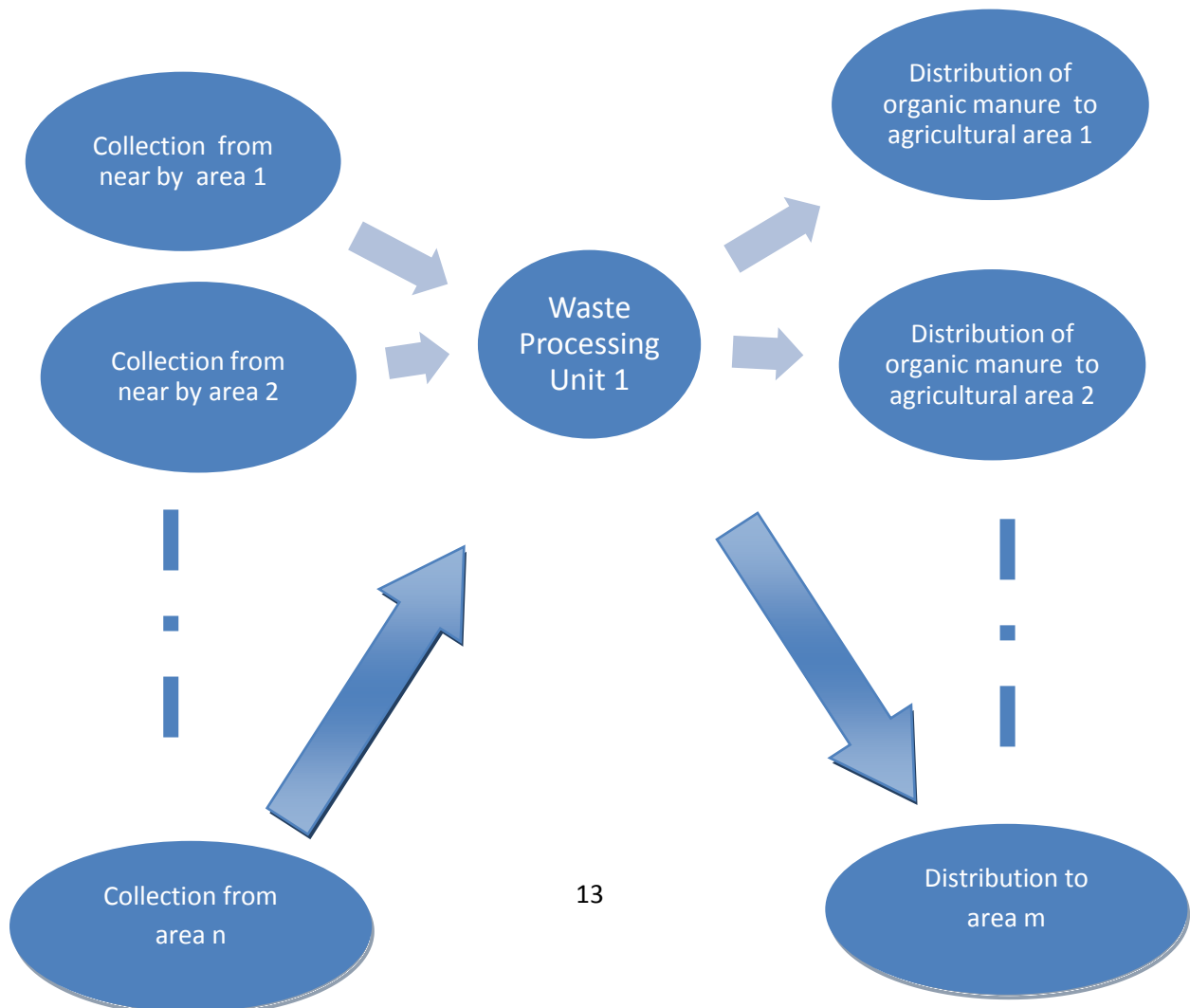


To further illustrate the point. Lets' consider the total area in each district and the total sown area, as a percentage of the land area. It is clear from the table below, that in Kerala, in all districts almost 50% of the land comes under some form of cultivation.

### Distribution of Farming Land in Kerala

	District	Total Geographic Area	Net Area Sown	Sown Area as % of total
1	Thiruvananthapuram	218781	143956	65.80
2	Kollam	248788	130007	52.26
3	Pathanamthitta	265277	81421	30.69
4	Alappuzha	141011	83546	59.25
5	Kottayam	220442	166519	75.54
6	Idukki	436328	210735	48.30
7	Eranakulam	305826	156258	51.09
8	Thrissur	302919	131679	43.47
9	Palakkad	447584	204787	45.75
10	Malappuram	355446	183493	51.62
11	Kozhikode	234641	157715	67.22
12	Wayanad	212966	115059	54.03
13	Kannur	297112	200476	67.47
14	Kasaragod	199166	135780	68.17
	<b>Total</b>	3886287	2101431	54.07

This particular distribution of agricultural land helps us implement Hub and Spoke model across Kerala.



In hub and spoke model, the processing of waste is decentralized, and small waste processing units are located in such a manner so as to minimize the following costs.

1. The cost of transportation of waste from the waste centers to the processing center
2. The cost of transportation of waste from processing center to the agricultural areas

Here waste centers could be households, markets or any other source of waste. The processing centre is the hub where the waste processing takes place. The manure so generated after waste generation will be distributed to the farm lands. In addition to reducing the cost of transportation for both waste processing as well as manure distribution, the hub and spoke model is expected to address the following problems as well

### Key Benefits

1. **Reduction in transportation cost:** the hub and spoke model will reduce the transportation cost to minimum, by strategically locating the processing centers.
2. **Low pollution due to waste processing:** In hub and spoke model, only a small portion of waste is processed in a particular area, so efficient processing can be done. The manure is effectively distributed to the farm areas, when the manure mass reaches a critical level. This is expected to reduce the storage problems associated with other waste processing plants, and hence will ensure smooth operation of plant.
3. **Supply to organic farmers:** This scheme will assure effective supply of manure to farmers, and hence solve one of the important issues related to organic farming, i.e. Unavailability of organic inputs.
4. **Supply to inorganic farmers:** the inorganic farmers in the area will also benefit from the distribution of manure, because manure has proved its effectiveness in improving the physical characteristics of the soil. Those farm lands, having low physical texture due to extensive inorganic farming, can also benefit from the same. The use of manure along with inorganic fertilizers had always helped farmers get better yield. It was confirmed by both our primary as well as the secondary research. Mr. Krishna CEO, of Satguna farms, mentioned it to us, during our interaction, with him. Similarly, 'Biogas digest'
5. **Biogas generation:** the organic waste can be used for biogas generation in the areas, where they operate. The slurry after biogas generation, its self is a good fertilizer.
6. **Less resistance from people:** If small waste processing plants, are located in different areas the resistance from the people will be low. This is because, the people, in the area are also beneficiaries of the plant, as they are getting biogas, as well as, manure for farming, at a very low cost from the plant.
7. **Synergy in Kudumbasree:** Kudumbasree units are involved in both collections of waste, as well as farming in Kerala. It would be easy for government to integrate these two, and

outsource the whole program to Kudumbasree units with proper monitoring. This could further empower the women, and create more self employment opportunities.

8. **Carbon Credits Trading:** Each waste processing unit can gain carbon credits, through waste processing and organic farming. This can be traded in the international market to make money. There are examples of NGO's making money in similar manner in certain panchayaths of Kerala.
9. **Bridging the information gap:** The waste processing centers, since they are involved in organic manure distribution, can develop relationship with farmers. It can be developed into an agency to educate farmers on the organic farming practices.

## Policy Requirements

In order to assure that organic farming and SWM, takes place in an effective manner, government support in terms of policy changes could be very helpful and can act as a key enabler. A broad outline on two policies, through which government could help the current situation in organic farming as well as the solid waste management, is given below.

### Legislation for giving more subsidies for organic farming

The subsidies given to organic farming are relatively low compared to inorganic farming. The fertilizer subsidy in 2011-12 is expected to increase from Rs. 690-700 billion to Rs. 820-850 billion, an increase of 20%. A large part of these subsidies goes to MNC's who are involved in manufacturing of fertilizers. If government can divert, some part of the subsidy to incentivise organic farming, that will benefit farmers across India, in the long run.

### Legislation or incentives to assure aggregation at Source

In Malaysia SWPCM ACT 2007 made it compulsory for every house to separate the non-organic and organic solid waste, and imposed a penalty of RM 1000 on households which violated the regulation. In Kerala, considering the high literacy rate, there is scope for policy making along the same lines, since the aggregation of waste at source could solve half the problems related to processing. This can be done by designing the collection rates in such a manner so as to give incentives to households who segregate waste and give it to collection agency. This could be done by reducing the rates for collection for those who aggregate the waste at source, and increasing the charge of collection for others. If the normal rate is 30Rs./month, we suggest a rate of 10 Rs./month for those who segregate at source and 60Rs./month for others. This will help increase the awareness about the issue, and also will be an incentive for people who adhere to the guidelines. The PR the legislation will generate, along with a campaign by government could possibly fasten the process.

## Conclusion

The recommendation given in this paper is expected to solve the issues related to organic farming as well as solid waste management to some extent. But there are many other broader issues, related to both SWM and organic farming which need to be addressed.

## References

1. ORGANIC FARMING IN INDIA : RELEVANCE, PROBLEMS AND CONSTRAINTS, by Dr. S. Narayanan
2. Status of organic farming in India, by P. Ramesh, N. R. Panwar, A. B. Singh, S. Ramana, Sushil Kumar Yadav, Rahul Shrivastava and A. Subba Rao
3. Kerala State Organic Farming Policy, Strategy and Action Plan
4. Organic Farming Can Feed the World, by OFAI
5. Economics and Efficiency of Organic Farming vis-à-vis Conventional Farming in India, by D. Kumara Charyulu, Subho Biswas Current Status of the Fertilizer Industry In India – Policy Environment and Implications for the future, by U.S. AWASTHI
6. Biogas Digest, Volume I, Biogas Basics, by Information and Advisory Service on Appropriate Technology
7. <http://www.kerenvis.nic.in>
8. Kerala government website
9. Malinya Mukta Keralam, Action Plan
10. Toolkit for Public Private Partnership frameworks in Municipal Solid Waste Management
11. Policy documents obtained from government
12. In depth interview with farmers, and other experts ( a few are mentioned in appendix)

# Appendix

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## Appendix A: Summary of Interviews in Preliminary Research

### In depth Interview with Organic Farmer and Leader Babu Sir (Duration: 3 hours)

#### Summary of interview:

There is high awareness on the need of organic farming in the area, even though it is a small town in Kozhikode. The area had more than 76 cows, and cow dung from around 20 cows was sufficient to meet the needs of organic farming in the area. They realized the need of organic farming after they found out that Breast Cancer was detected in the area for the first time. Initially when they started working, the government denied them any corporation dismissing organic farming as low yield. But in the later stage they defied the authorities, and started organic farming with support from local institutions like NSS. The support was required because the method is labor intensive. The method resulted in High Yield and better productivity in the area. They were also able to sell it at a premium price in the local market.

After the initial success he got a lot of support from government. Now encouraged by the success more people showed interest, they designed small organic farms in each house. Households were provided with seeds as per the requirement by community with help of government and the farmer community in the area. The project was a success. The food needs of the locals are met through the farming in their homes.

He identified lack of support from research institutions as a major issue in organic farming. The organic pesticides at times are not that effective in tackling the pest problems. He also mentioned about the high costs of inputs during the initial years as a major concern with organic farming. But he was convinced that, for long term organic farming is the way to go.

### Expert Interview with Organic Farming Consultant: Mrs. Revathy: Director, INSPIRE (Duration 5 hours)

The key learning's from the interview are summarized below. The interview was regarding the need for an organic farming institute she is planning to setup in India.

**Disadvantages of current system:** Soils have physical, biological and chemical properties. The inorganic farming methods take care of only chemical properties that too limited to mostly NPK. Plants need 16 micro and 7 macro nutrients. The use of fertilizers like urea increases water storage by 7 times. As water stored in plant body increases immunity decreases. This necessitates the use of pesticides. The new crops were developed to address this problem. The inorganic farming practices are unsustainable and research has proven the same. This has caused problems to all stakeholders, whether its consumers health or the returns of farmers. All the mainstream institutions are now supporting only chemical farming. The only group which gets benefited by this is the corporate who manufacture these pesticides. The huge fertilizer subsidies amounting to 190000 crore Rs. goes directly to these corporate. (2500 Rs. Bag sold for 350 Rs. differences is subsidy). The organic farming

practices though widely promoted in developed nations through subsidies and research, it is not promoted in India mostly due to corporate lobbying.

**Organic Advantage:** The organization started by Ms. Revathy called INSPIRE (Institute of Pioneers for Rejuvenating Earth) is training farmers and promoting organic farming. Organic is a word collecting many other words like Natural farming, Ecological farming, Biodynamic agriculture, Therma culture etc. there are many other emerging schools of thought. The main issues in farming are information gap and lack of awareness of organic methods among the farmers. The other related issues include non farmer friendly policies farmers losing their traditional connect and lack of research and research persons.

Even those who want to practice organic farming are not doing e.g. many farmers largely depend upon cow dung for organic farming and don't do it because of the presumed high cost of inputs, in reality it is very low. But if we use it as inoculums to multiply other microorganisms, 1 cow can cater needs of 30 acres of land. We can generate everything in the farm itself.

The institution concentrates on research and dissemination of information. Capacity building programs for different stakeholders: farmers, politicians, academicians are conducted. Networking will also help farmers. It will educate farmers on how to build soil characteristics, how they can grow organic mixed products and there other concerns. The organic movement is slow because it is lead by farmers and not by professionals. The certifications costs are also high. The marketing power is not there with organic farmers, so a large part of market premium for organic products enjoyed by companies. A collective effort from farmers for marketing is required. The institute facilitates it through training programs.

Mono cropping is promoted in inorganic farming as the package of fertilizers for each seed is different in inorganic farming and so it's cost effective to do mono farming. But it destroys the soil and increases the market risk. Organic farming is centralized on soil and hence same treatment for all plants. So farmers are benefited in the long run. The companion plant (which helps to maintain fertility of soil) concept is introduced during the training program; the farmers can select a companion plant for their crop from a large set according to the market conditions. This will ensure money flow throughout the year for farmers. So the landless laborers need not migrate and can sustain throughout the year from wages they get. This is very important in India where 25 crore farmers are landowners 46 crore are landless laborers. Now the India is under a famine threat due to aggressive inorganic farming and the only way out is through Organic means.

### **Purely organic Farmer (Mr. Jose Elanjimattam) (Duration 45 minutes)**

Mr Jose gave insights into why he turned to inorganic farming. His reason was clear and simple. Excessive use of pesticides/chemicals had led to an attack of Kookvilt (pest) which infected the black pepper plantation and resulted into a loss of his efforts and all other inputs which went into the black pepper cultivation for three years. This reason was a sufficient incentive for him to turn to Organic Farming.

He has now undertaken organic methods like Vermicompost and Biogas and Cowdung usage which is sufficient for the pesticide and organic manure requirements for his farm. An additional advantage he has due to this has been the supply of biogas which makes him self sufficient in cooking gas requirements. Some points he came up in support of organic

farming was that this has been the culture which was followed by his forefathers and he realised that it was the sole reason of absence of ailments during ancient times.

**A Farmer undertaking both Organic and Inorganic Methods in farming (Mr. Hussein)  
(Duration: 45 minutes)**

We then met Mr Hussein who was employing both organic and inorganic fertilizers in a ratio of 1:1. This he said was a logical and feasible option as the rate of degradation by use of pure chemicals was offset by the use of right amount of inorganic fertilizers. At the same time the low productivity due to pure use of inorganic fertilizers was offset by adequate use of inorganic chemicals. He also highlighted the shortage of organic fertilizers and increased amount of water requirement in case of continued use of inorganic chemicals.

**A farmer who reverted back from inorganic to organic farming: (Mr Ravindran)  
(Duration: 45 minutes)**

Upon meeting up with Mr Ravindran who had reverted back to inorganic from organic farming we gauged the problems faced by a farmer who does not own cattle. In spite of being fully aware of disadvantages of inorganic farming in the long run he had to take on inorganic farming. He also aptly formed an analogy between organic-inorganic duo and ayurveda – allopathy.

**Interview with expert: Seed Research Institute, Calicut, (Duration 1 hour)**

**Summary of the interview:**

He explained about how organic farming is a long term solution, and what the limitations of the farming procedure are. He said as if now, the organic pesticides are not highly developed, they use traditional methods like neem oil and organic biodynamic mixtures. On the fertilizer side, there are many organic fertilizers available in the market, but they are not highly subsidized. The broadaxe mixture is considered as organic.

They have done research in the organic farming methodologies and found that the organic farming is good for soil and it improves the quality of the yield. The issue with organic farming is the quantity in the initial stages and pest attack. They have not developed any effective ways to tackle the pest issue associated with Organic Farming. The serious issue with the inorganic farming as identified by research is, in the long term, the cost for farming will keep on increasing.