Government of Karnataka

Proposal for

Solid and Liquid Waste Management in Rural Areas

Swachh Bharath Mission (G)

Submitted to

IDF- OI

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1. Project Location:

2. Aim of the project:

The need for genuine and organized initiatives in the rural waste management has been regularly noticed in India. With the emerging concern on large quantity of the waste being produced both in the form of solid and liquid, the concept of waste management becomes one of the key focus of sustainable development principles which is based on policies and practices that are resource-conserving, follow standards that can be met in the long term in terms of sustainability.

Waste being a severe threat to the public health concern and cleanliness, the form of waste generated in rural areas is predominantly organic and biodegradable, yet becoming a major problem to the overall sustainability of sanitation condition in rural areas and ecological balance. Hence the maintenance/ management of these wastes requires much attention to achieve the concept of Swach Grams sanitation

Solid and Liquid Waste Management is one of the key components of any sanitation initiatives which is rightly emphasized and focused in Swach Bharath Mission programme (SBM). The main aim is to have an **effective Solid and Liquid Waste Management – By 2022**; such that the village environment is kept clean at all times by improving the levels of cleanliness and making Gram Panchayaths clean and sanitized.

3. Justification of the project:

The proposed project aims at safe, sustainable and effective Solid and Liquid Waste Management in the proposed 3 Districts viz, Udupi, Dakshina Kannada and Uttara Kannada comprising the proposals of total 77 Gram Panchayaths to be targeted and all the Gram Panchayaths have the land required for the project implementation.

Community, as a resource, can play an active role in taking responsibility for their garbage and liquid waste. The rural Dakshina Kannada has shown the transformation with effective waste management so far. This is being summarized in the simple formula of the 4R's: Reduce, Reuse,

Recover and Recycle. But the major challenge being faced by these districts are that it is located in region of Western Ghats of Karnataka, mostly scattered households and other establishments (Social & commercial) where the collection, transportation, processing, recycling or disposal of waste materials is very much decentralized. Hence it requires optimal financial support to establish proper infrastructure for effective waste management at Grama Panchayath level.

The detailed statistics of proposed 77 Gram Panchayaths of 3 Districts are enclosed. With the given scenario it is essentially required to address the issue by implement various cost effective SLWM technologies as per their local needs

- Solid and Liquid Waste Management in Rural Areas is an Existing project which falls under Social development sector; Environmental safeguard

4. Target beneficiaries:

Sl no	Name of District	Number of beneficiaries	Nature
1	Dakshina Kannada	31,156	Rural
2	Uttara Kannada	58,416	Rural
3	Udupi	173,143	Rural

5. Geographic location;

Sl no	Name of District	Location
1	Dakshina Kannada	Gram Panchayaths of South western region of Karnataka
2	Uttara Kannada	Gram Panchayaths of South western region of Karnataka
3	Udupi	Gram Panchayaths of South western region of Karnataka

6. Design of project (methodology)

The project will be implemented in collaboration with Zilla Panchayath (District Administration) and the Department of Rural Development and Panchayath Raj. At the state high level steering committee will be constituted and headed by the principal secretary RDPR for overall monitoring and guidance of the project and will meet every 2 months to review the project. The committee will be composed of;

1. Principal Secretary (Chairperson of committee)
2. Commissioner , RWS &SD
3. Additional Director, SBM
4. CEOs of Zilla Panchayth
5. Representative from International Organisation

As part of the project execution, the monitoring, review and coordination would be done through:

- State level consultative meeting once in two months
- Review meetings among field staff at district level
- Regular meetings at the project level

The Zilla Panchayaths will be the implementation agency. The Zilla Panchayath will open a separate bank account to receive the funds from ODF before starting of the project after approval of the project.

Given the major risk of the project is that of raising expectations of the communities, monitoring and evaluation (M&E) of project interventions becomes even more necessary to maintain the momentum built, keep realistic targets and revise strategies according to the presiding circumstances. M&E with these intentions will rationalize community expectations, allow periodic review of the value of such efforts and help sustain community's enthusiasm to participate in project activities.

Monitoring will occur at different levels on a quarterly basis along the following lines:

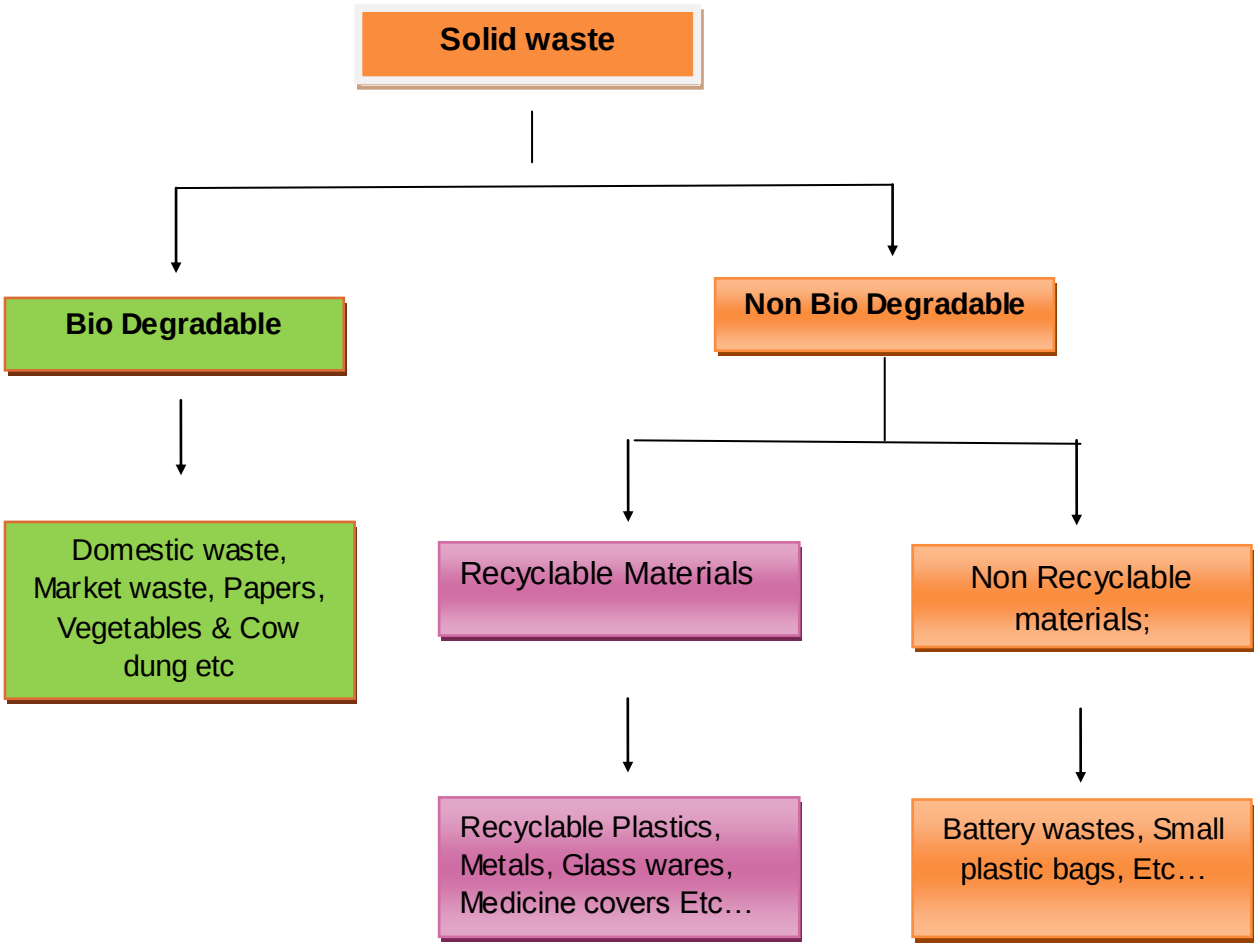
Monthly meetings will involve all the District level responsible Officials, Executive Officers and PDOs and progress will be measured against the work plan set in the proposal. Any changes made to the work plan will be explained and documented.

7. Intervention:

With growing population and change in lifestyle lot of waste is getting generated. If these wastes are not handled systematically, there is a danger that every citizen's health residing in the town is at great risk. If it is managed it do fetches returns also. Accordingly entire village / town to be zoned and movement of vehicles can be streamlined and to be collected at a site, wherein with

minimum cost collected waste will be converted in to resource, which intern can find its application in agriculture paving the way for organic forming. In composting the collected solid waste, biological process will be involved which has proved to be cost effective and also sustainable than that of Mechanical processing. The solid waste generated from the village is primarily and thus does not contain any toxic substances. The solid waste are generated from the kitchens are domestic in nature, which can very easily be treated using eco friendly methods.

Classification of Solid Wastes



8. Approaches for Solid Waste Management:

For effective management of solid waste in rural areas, focus should be on management at household level. That which cannot be managed at household level is managed at the community level. In general, the following approaches will be followed:

- Segregation of solid waste at the household level (Biodegradable and non-biodegradable)
- Reuse of non-biodegradable waste at the household level to the extent possible
- Household level treatment of bio degradable waste

9. Steps for Effective Management of Solid Waste:

9.1 Management of Household Level Solid Waste

As far as possible, solid waste is initiated to manage at the household level so that minimum community waste is generated. This may involve the following steps:

1) **Sorting out or segregation at household level:**

- Household waste should be sorted out or segregated at the source i.e. at the household level
- This is to be done by generating awareness to sort out waste at the household level by keeping biodegradable and non-biodegradable waste in separate colour bins of 5 to 10 liters capacity each (e.g. green color bin for bio degradable waste and blue bin for non bio degradable waste)
- Reusable segregated non-biodegradable waste may be reutilized at household level

2) **Treatment/management of biodegradable household level waste:**

Efforts should be made to treat the segregated bio degradable waste at the household level by adopting any one of the following technologies and reuse the treated products:

- Composting
- Vermi composting
- Biogas plant.

The details of all the above technology options have been discussed separately.

3) **Treatment/management of household level non biodegradable waste:**

Some of the sorted out non bio degradable waste will be of recyclable type. Households may be encouraged to keep such waste separately and sell to the rag pickers and kabadiwalas and keep the non-recyclable products for subsequent transportation for community level management.

9.2 Management of Community Level Solid Waste:

In those villages where all the waste cannot be managed at household level, segregated and non-managed household waste need to be transported either to the community bins at the village level or to the treatment plant sites at community level where household level bio degradable waste can be treated by community treatment plant and recyclable and non bio degradable waste can be sorted out and sold to the kabadiwalas by gram panchayats. Waste which cannot be composted, reused or recycled may be disposed at community level at the landfill sites following appropriate procedure:

1) **Collection and transportation:** For Collection and Transportation of solid waste in rural areas the following strategy may be followed:

- Self Help Groups (SHGs) or group of unemployed youth in the village may be identified for collection and transportation of household waste to community storage/ treatment site. Each member may be responsible for collection of waste for about 75-100 households
- SHG members may be given suitable number of carts or tricycles for collection and transportation of waste to community storage bins. The number of tricycles may be decided based on the size of the PRI and the density of population. Normally one tricycle for 100-200 households should suffice the requirement.
- The PRI should keep at least two-three spare tricycles so that the collection system is sustainable even in the case of breakdown of few tricycles.

2) **Treatment of community level biodegradable waste:**

Once the segregated waste is collected at the community level, the **biodegradable waste** may be treated by adopting any of the following technology options:

- Composting
- Vermi composting

- Biogas plant.

The details of the all the above technology options have been discussed separately.

3) Treatment/management of <u>non-biodegradable</u> waste:

The non-bio degradable waste may be further sorted into various categories (e.g. plastic, paper, metals, cloth etc). Those which are recyclable may be sold to kabadiwalas or recycled at the community level by adopting suitable technologies some of which are discussed separately. Those waste materials which can neither be recycled nor sold may be sent to the landfill sites in the villages

10. Technological option for Treatment of Biodegradable Waste

10.1 Composting Method

Composting is one of the options for treatment of solid waste. In composting process the organic matter breaks down under bacterial action resulting in the formation of humus like material called compost. The value of compost as manure depends on the quantity and quality of feed materials poured into the compost pit. Composting is carried out in two ways:

a. *Aerobically* (in presence of oxygen) and

b. *Anaerobically* (in absence of oxygen).

During **aerobic** composting, aerobic micro – organisms oxidizes organic compounds in the solid waste to carbon-dioxide, nitrite and nitrate. The carbon from organic compounds is used as a source of energy while nitrogen is recycled. Due to exothermic reactions, temperature of the mass rises.

During **anaerobic** process, the anaerobic microorganism, while metabolizing the nutrients, break down the organic compounds through a process of reduction. A very small amount of energy is released during the process and the temperature of the composting mass does not raise much. The gases evolved are mainly Methane and Carbon-dioxide. An anaerobic process is a reduction process and the final product is subjected to some minor oxidations when applied to land.

Manure from composting gives better yield to farmers and it is also environment friendly.

Bio degradable solid waste can be composted either in compost pit or in a vermi compost pit.

Compost pit can be underground unlined compost pit or over ground compost – heap method or over ground brick line compost pit. Vermi compost can be done in vermi tank (four pit model) or vermin compost in sheds. Composting of bio degradable solid waste can take place in biogas plants also. Slurry from the biogas plant can also be utilized for production of vermi compost.

Advantages of Composting

- By proper decomposition, biodegradable waste gets converted into good quality organic manure whereby waste is turned into wealth

- Prevents vector breeding and breeding of rodents
- In aerobic composting process considerable heat is generated, resulting in destruction of pathogens and weed seeds
- Insanitary conditions arising out of solid waste are removed and aesthetically, environment looks neat and clean

Description

Composting is carried out in a simple manure pit or garbage pit (lined or unlined).In this process aerobic microorganisms oxidize organic compounds to carbon-dioxide and oxides of nitrogen and carbon from organic compounds is used as a source of energy, while nitrogen is recycled. As discussed above, in the composting process, due to exothermic reactions, temperature of mass rises. In areas/regions with higher rainfall composting in over ground heaps is advisable.

The factors affecting the composting process are:

1. Micro-organisms
2. Moisture
3. Temperature and
4. Carbon/Nitrogen (C/N) ratio.

Household Level Composting

- Two manure pits should be dug.
- Size of the pit will depend upon the quantity of refuse to be disposed of per day.
- Garbage, cattle dung, straw, plant and agriculture wastes to be dumped into the manure pit each day
- When one pit is closed the other one is used.
- In 4 to 5 months' time, the refuse is converted into manure, which can be used in the fields.

This is the most effective and simplest method of disposal of waste for the rural households. Cow dung can also be disposed of easily by this method. Mixing of cow dung slurry with the garbage will help greatly in converting the refuse into compost, which provides good manure.

- Household level composting pits may be constructed by adopting either lined or unlined pits as described below:

Applicability		Description
Underground lined pit	For Rural areas with low rainfall	1. Two Pits of 1m x 1m x 1m dimension 2. Single layer of broken bricks at the bottom 3. Make a ridge with the help of mud at the periphery of the pit & compact it by light ramming.
Underground brick lined pit	For Rural areas with low rainfall -Loose soil structure	1. Two pits of 1.1m dia & 1m depth 2. Construct a circular pit having 1M inner dia of 100mm thick brick masonry. The height of the circular pit should be 100mm above ground 3. Plaster the top layer of the pit 4. The bottom of the pit should not be cemented
Over ground heap	For Rural areas with high rainfall and rocky terrain	Raised platform of 1m x 1m dimension at a suitable site by ramming the soil or by paving with bricks.
Over ground brick lined compost tank	For Rural areas with high rainfall and rocky terrain	1. Two compost tanks of 1.1m dia & 1m height 2. Construct a circular/square tank having an inner dimension of 1 m, in honey comb 225mm thick brick masonry. The height of the tank should be 0.8m above ground. 3. Plaster the top layer of the tank.

Use and maintenance of the pits

- Go on adding garbage from the house over the layer of bricks (only biodegradable type)
- When the garbage attains a height of about 150mm, add dung slurry, mix it with garbage & level it
- Spread a very thin layer of soil over it (once a week) to avoid odor & fly nuisance
- Continue to add garbage everyday
- Follow the above procedure & repeat the layer till the pit is full. It is recommended to fill the pit up to about 300mm above ground level
- After 3-4 days the garbage above ground settles down
- Plaster it with soil
- Leave the pit as it is for 3-6 months for maturation
- After 3-6 months take out the compost & use it in the fields
- Till the manure in the pit matures, use another pit of the same dimensions, dug at a minimum distance of 1m from the first pit.

Community level composting

Community level composting may be resorted to when management of solid waste at household level is not possible. For community level composting, Panchayat should select a suitable site as Compost Yard for the village. Site should be selected taking into consideration wind flow direction, so that the inhabited areas don't get any foul odor. The site should be easily accessible for transportation of waste and manure. It should not be a low lying area to avoid water logging.

The construction of composting pit or heap is very simple and user friendly. *Gram Panchayat* (GP) can easily construct compost pit with little technical support from outside

Applicability		**Description**
Underground unlined pit	For Rural areas with low rainfall Lack of space for Household composting	1. Dig adequate number of pits of not more than 1m (depth) x 1.5m (width) x 3m (length) dimension depending upon quantum of garbage generated 2. Make a ridge with the help of soil at the periphery of the pit & compact it by light ramming.
Underground brick lined pit	For Rural areas with low rainfall Lack of space for Household composting	1. Construct rectangular pits having inner dimensions of 1m x 1.5m x 3m in honey comb 225mm thick brick masonry. 2. The height of the pit should be 100mm above ground 3. Plaster the top layer of the pit 4. The bottom of the pit should not be cemented
Over ground heap	For Rural areas with high rainfall and rocky terrain Lack of space for Household composting	Raised platform of 1.5m x 3m dimension at a suitable site by ramming the soil or by paving with bricks.

Over ground brick lined compost tank	For Rural areas with high rainfall and rocky terrain Lack of space for Household composting	1. Make adequate number of compost tanks of dimension 0.8m height, 1.5m width an 3m length in honey comb 225mm thick brick masonry 2. Plaster the top layer of the tank.

Use and maintenance of the pits

- Go on adding collected garbage in the pits (only biodegradable type)
- Wherever possible, it is advisable to add cow dung slurry to the garbage to enhance the composting process
- Spread a very thin layer of soil over it (once a week) to avoid odor & fly nuisance
- Continue to add garbage everyday
- Follow the above procedure & repeat the layers till the pit is full. It is recommended to fill the pit up to about 300mm above ground level.
- After 3-4 days the garbage above ground settles down
- Plaster it with soil
- Leave the pit as it is for 3-6 months for maturation and start other pits sequentially
- After 3-6 months take out the compost & use it in the fields.

(1) Vermi Composting

Vermi composting involves the stabilization of organic solid waste through earthworm consumption which converts the material into worm castings. Vermi composting is the result of combined activity of microorganisms and earthworms *(Eisenia foetida and Eudrilus euginiae & Lampito mauritii)*. Microbial decomposition of biodegradable organic matter occurs through extracellular enzymatic activities (primary decomposition) whereas decomposition in earthworm occurs in elementary tract by micro-organisms inhabiting the gut (secondary decomposition). Microbes such as fungi, actinomycetes, protozoa etc. are reported to inhabit the gut of earthworms. Ingested feed substrates are subjected to grinding in the interior part of the worms gut (gizzard) resulting in particle size reduction. Vermi technology, a tripartite system which involves biomass, microbes and earthworms is influenced by the abiotic factors such as temperature, moisture, aeration etc. Conditions unfavorable to aerobic decomposition result in mortality of earthworms and subsequently no vermi composting occurs. Unfavorable conditions such as particle size of biomass and extent of its decomposition, very large temperature increase, anaerobic condition, toxicity of decomposition products etc influence activity of worms.

Hence, **preprocessing of the waste as well as providing favorable environmental condition is necessary for vermi composting. 50kg worms give 50kg manure per day.** These worms are known to survive in the moisture range of **20-80%** and the temperature range of **20-40°C.** The worms do not survive in pure organic substrates containing more that 40% fermentable organic substances. Hence **fresh waste** is commonly mixed with partially or fully stabilized waste before it is subjected to vermi composting. It may be done using **compost beds as well as tanks** at both household and community levels.

Advantages of vermin composting

- Conversion of cattle dung and cattle dung based biogas slurry, kitchen/food waste, leaves etc (organic solid waste) into high quality organic manure which are otherwise wasted
- It is a fast process which requires only 40-45 days as compared to the conventional process
- The process is free from foul odor
- Complete destruction of weed seeds

- Vermi compost contains plant growth hormones and anti-fungal elements which leads to high value addition and profitability
- Prevents vector breeding & insanitary conditions
- The technology is simple and it is easy to adopt and replicate
- Requires very little land area
- Applicable at household, community and mini commercial scale

Vermicomposting operation at Community Level

The steps to be followed for vermicomposting at community level are:

- Vermitank should have minimum four pits, which are interconnected by partition walls constructed in honeycomb masonry. The four pits are to be used one by one in a cyclic manner.
- Each pit has a capacity to accommodate garbage for 15 days. Thus the total duration of one cycle is nearly 60 days. When the fourth pit is full, the vermicompost in the first one is ready for harvesting.

It can be also being constructed in the following places:

a. Individual house
b. Small communities
c. Public buildings (such as Zilla Parishad office, food establishment, Gaushala, Primary Health Center, BDO office etc.)
d. Institutions (schools, colleges etc.)
e. Gardens & Temples

Preliminary steps

- Appropriate site selection: the site should be protected from direct sunlight and should not be in low lying areas
- Vermiculture site preparation; Proper ramming of soil or preparation of platform is required before preparation of vermicompost beds
- Construction of appropriate shed: thatched roof/tin sheds on bamboo/metal poles with proper slope to drain rain water, and proper ventilation

- The biodegradable waste should be predigested in a separate bed before transferring to the treatment beds

Vermiculture bed preparation

- Make a basic bed of size 24 cft (L=8ft,B=3ft, Ht =1ft) with one brick (9 inch x 4 inch x 3 inch) size containment all-round the bed
- Alternatively, brick tanks of same dimensions having 2 feet height may be constructed. With this worms will not escape to the surroundings. The worms are also protected from natural enemies. The tank may be easily covered with a wire mesh
- Apply a layer of cow dung slurry on the base
- Put one inch sand on the cow dung slurry plastered bed
- Followed by putting 2 inch thick organic waste
- Put 9 inch thick feeding material (cow dung/ biodegradable organic matter such as leaves, kitchen waste) for earthworms in the ratio of raw cow dung: organic waste = 1:5.

Process

Step 1: Transfer the predigested material in heaps to the vermin compost beds.

Step 2: Apply about 100gm of earthworms or every square feet of surface area of the compost bed.

Step 3: Cover the entire bed immediately with gunny bags to reduce light penetration and create dark environment and maintain required moisture content in the feed bed for better performance of the earthworms for digestion of the feed material.

Step 4: To maintain moisture, sprinkle water on alternate day/every day in summer and 3 to 4 days intervals/twice a week in winter.

Step 5: After 1 month of introducing the earthworms, remove the gunny bags and keep the heaps open to air for a day, collect the top 2 inch layer of earthworm compost by slow & smooth scrapping of the top layer of the compost bed till you observe the earthworms. When you see earthworms, stop scrapping; this is done to send the earthworms down into feeding materials in the feed bed.

Step 6: Screen the harvested vermi compost through an appropriate sieve and reintroduce the course material as well as separated earthworms to the empty treatment beds

Step 7: Again add the predigested material in the bed and repeat the process.

Measures to be taken

- Proper covering of feed bed (local available materials such as coconut leaves etc may be used for covering of the vermicompost pit)
- Avoid excess water (only sprinkling)
- Protect the shed area and the beds from red ants, cockroaches etc. by using *haldi* (turmeric) sprinkling *atta* (flour) all around the perimeter of the shed and the bed
- Keep the feed beds away from birds/chicken/ ducks/rodents from eating the worms.

Operation & maintenance

The user of the system may be required to undertake certain commitments for proper maintenance of the vermi composting system (Compost Pit and Vermi compost Tank) including the following aspects:

- To ensure temperature range 20 to 30°c is maintained
- Over sprinkling of water is avoided
- Proper turning operations to be followed
- Vermi compost removed periodically from the pit by careful scrapping without disturbing movement of earthworms in the pit
- To ensure that no heavy metals go along with feed materials
- To ensure feed materials of required quantity and quality are added daily to the systems
- Ensure red ants do not get entry into the system
- To ensure basic layer is not disturbed.

Note-Arrangement to be made by providing a small pipe connection with a tap at the bottom of the vermi tank at an appropriate place for the collection of thick brown color liquid known as Vermi Wash in a small pit adjacent to the vermi tank. Vermi Wash contains different bacterial inoculants and also fluid of earthworms, which contain a variety of plant growth promoting enzymes. Vermi wash is an important by product of vermi composting process

Worms for Vermi compost

Biogas

When biodegradable organic solid waste is subjected to anaerobic decomposition, a gaseous mixture of Methene (CH4) and Carbon-dioxide (C02) known as **Biogas** could be produced under favorable conditions.

The group of microorganisms involved for biogas generation is mainly the bacteria.

Fuel Efficiency of Biogas

The fuel efficiency of cattle dung is 11% and that of Biogas from same dung is 60%, Biogas technology holds promise of revolutionizing energy scene-conserving forests, preventing soil erosion and providing energy security in rural India. Normally a 3 cum. capacity biogas plant is considered sufficient to meet the heating and lighting needs of a rural family of 6 to 9 persons

The biogas technology can be used for management of bio degradable solid waste (portion) generated from:

Household

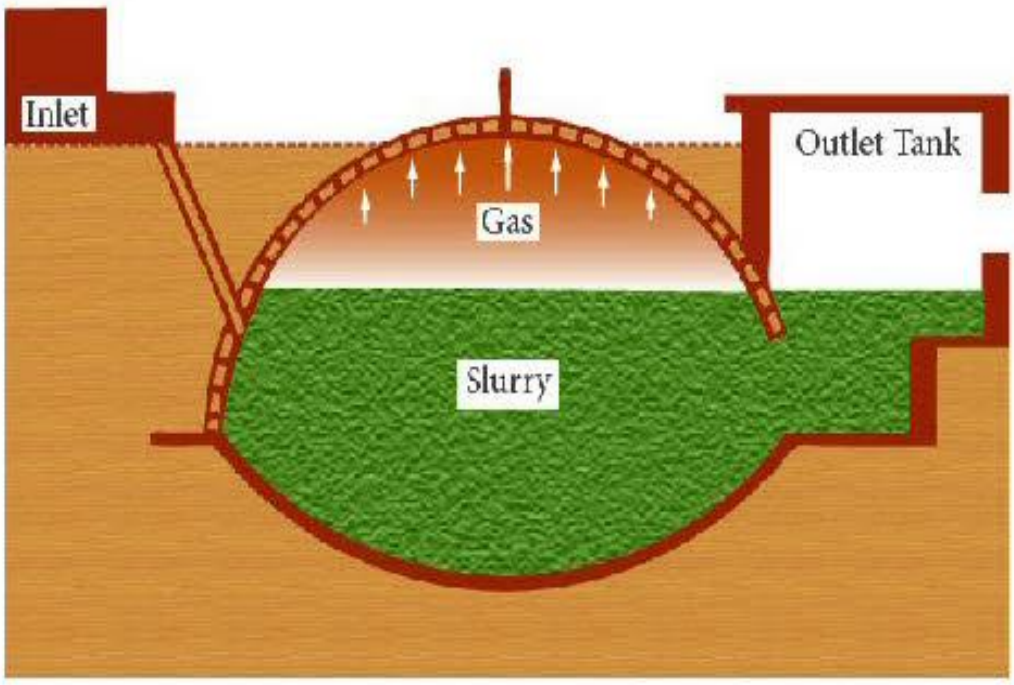
- Kitchen waste, cattle dung, garden waste, leaves of trees can be digested and digested product reused at household level.

Community

- Community bio degradable waste such as stray cattle dung and from Gaushalas, garden waste, leaves of roadside trees, human excreta from individual/community toilet etc, can be digested in community biogas plant and end products can be reused.
- Commercial establishment- Commercial bio degradable waste generated from hotels, parks and gardens, *subzi mandis* (vegetable markets) and roadside tree leaves etc. can be digested in commercial biogas plant and the end

Products can be fruitfully utilized commercially such as gas engine, cng productions, lifting water for irrigation purposes etc.

Process in Bio Gas plant:



Feed Materials for Biogas Plant

Organic materials are used as feed materials for Biogas plant. Generally, the following organic materials are used:

- Cattle dung (gobar)-(any model)
- Human excreta (floating dome type with water jacket and fixed dome type)
- Kitchen/Vegetable waste (Floating dome model).

11. Expected outcomes/ benefits proposed:

The following are the benefits of the proposed projects

- Protected human health and improved quality of life among people living in rural areas
- Environment pollution reduced and rural areas become clean
- Both solid and liquid waste recycled and reused
- Bio waste converted into energy
- Employment generated for rural people by offering new opportunities in waste management by adopting cost effective and environmentally sound waste water and solid waste treatment technologies

12. Project timeline:

Duration: 6 months to one year from the date of approval of the project

13. Estimated budget:

S. No	Name of District	Number of Gram Panchayaths	Total estimated budget (in lakhs)
1	Dakshina Kannada	4	150.00
2	Uttara Kannada	38	1343.00
3	Udupi	35	1184.7
Grand total			2677.7

Some of the projects are inclusive of capital and maintenance cost and some of them are exclusive of maintenance cost

14. Selected Gram Panchayaths for SLWM Activity:

14.1 Udupi District

Sl No	Gram Panchayath	Total House holds	Population	Site is available for SLWM unit	Survey No of the site	Area (in acres)	Quantum of waste per day (in k.gs)			Estimated Unit cost (in lakhs)	Technology to be adopted
							Wet waste	Dry Waste	Total		
Kundapur Taluk											
1	Khambadakone	1162	4372	Yes	109/2B	4.75	562	187	750	31.49	Com post
2	Amparu	1073	4943	Yes	166	0.5	600	200	800	31.22	,,
3	Heroor	544	2382	Yes	185	0.2	375	125	500	29.63	"
4	Hombadi Mandadi	1536	6335	Yes	211	0.1	450	150	600.00	32.61	"
5	Hemmadi	923	3983	Yes	108	2.54	975	325	1300	42.27	"
6	Nada	2117	8322	Yes	157	1	1050	350	1400	45.85	"
7	Kalavara	1568	5236	Yes	20/2c	0.71	487.5	162	650	32.70	"
8	Amasebailu	1537	7797	Yes	198/2A	0.5	562.5	187	750	32.61	"
9	Madamakki	850	4232	Yes	65/P1	1	487.5	162	650	30.55	"
10	Kumbhashi	1087	4797	Yes	286/2B P2	0.93	900	300	1200	42.76	"
Udupi Taluk											
1	Barkur	1092	4978	Yes	15	0.75	900	300	1200	42.78	"
2	Hanehalli	1030	2730	Yes	23/1A	3.20	570	190	760	31.09	"
3	Bairamaplli	1248	2251	Yes	87/1	1.00	525	175	700	31.74	"
4	Uppoor	1880	7823	Yes	293/1A	4.00	900	300	1200	45.14	"
5	Mudarangadi	1721	6247	Yes	142/1A P1-P1	2.00	1050	350	1400	44.66	"
6	Varamballi	1585	6178	Yes	206/182	0.50	3098	1032	4131	48.26	"
7	Cherkadi	1442	6335	Yes	387	0.80	600	200	800	32.33	"
8	Kuthyar	1519	7249	Yes	81/2	2.40	562	188	750	32.56	"
9	Belapu	1032	4127	Yes	79/3C	0.50	450	150	600	31.10	"

10	Heggunje	1288	5743	Yes	194	3.00	900	300	1200	31.86	"
11	Belle	1634	7656	Yes	198	2.00	1312	437.5	1750	44.40	"
Karkala Taluk											
1	Bola	1055	4350	Yes	340	0.30	960	240	1200	28.17	"
2	Hirgana	1259	4693	Yes	263	0.50	1200	300	1500	31.78	"
3	Inna	851	3576	Yes	183/2	0.50	720	180	900	22.55	"
4	Kadthala	1234	3252	Yes	313	0.50	1200	300	1500	31.70	"
5	Kuchuru	896	2054	Yes	49/1	0.10	960	240	1200	27.69	"
6	Kukkundoor	3172	12162	Yes	281/¦2	6.29	1360	340	1700	49.02	"
8	Mudradi	1440	4819	Yes	186/1¦	0.50	1040	260	1300	33.32	"
9	Nallur	1283	5676	Yes	251/1	0.5	880	220	1100	31.85	"
10	Palli	1402	5548	Yes	278	1.20	800	200	1000	26.21	"
11	Renjala	787	2905	Yes	169/1¹ 7	1.50	880	220	1100	32.36	"
12	Irvathuru	645	2882	Yes	288/1J 1	1.00	800	200	1000	26.94	"
13	Shirlal	824	3284	Yes	5	4.92	11200	2800	14000	37.47	"
14	Shivapura	1017	4226	Yes	41	1.00	11200	2800	14000	38.05	"

14.2 Uttara Kannada District:

Sl No	**Name of Taluk**	**Name of the Gram Panchayath**	**Whether land is available**	**No of households**	**Quantum of waste generated in kgs**	**Total Estimated cost(in Lakhs)**	**Methodology**
1	Ankola	Bobrovada	yes	2272	6850	40.00	Composting / Vermin composting
2	Supa	Ramanagar	yes	2030	4890	35.00	"
3	Supa	Ulavi	yes	798	3458	40.00	"
4	Karwar	Chittakula	yes	2378	5698	45.00	"

5	Karwar	Majali	yes	1618	4568	45.00	"
6	Siddapur	Halageri	yes	1660	4879	35.00	"
7	Siddapur	Tarehalli kansur	yes	1201	3578	40.00	"
8	Siddapur	Kangod	yes	1089	3458	35.00	"
9	Yellapur	Ummachigi	yes	1198	4896	45.00	"
10	Yellapur	Manchikeri (kampli)	yes	807	3568	40.00	"
11	Mundgod	Indoor	yes	1344	4569	35.00	"
12	Mundgod	Katur	yes	938	3658	40.00	"
13	Mundgod	Pala	yes	758	2689	35.00	"
14	Mundgod	Chigalli	yes	1420	4256,	30.00	"
15	Mundgod	Bachanaki	yes	1351	3589	35.00	"
16	Kumta	Mirjan	yes	1492	4268	40.00	"
17	Kumta	Nadumaskeri	yes	1571	2750	35.00	"
18	Kumta	Hegde	yes	2561	6850	40.00	"
19	KUMTA	Kagal	yes	2038	4890	38.00	"
20	Honnaur	Kasarakod	yes	2638	3458	45.00	"
21	Honnaur	Karki	yes	1550	5498	35.00	"
22	Honnaur	Manki	yes	2533	3658	40.00	"
23	Bhatkal	Mavalli	yes	2337	4639	45.00	"
24	Bhatkal	Yalvadikavur	yes	1730	4126	35.00	"
25	Bhatkal	Mavinakurve	yes	1372	3980	30.00	"
26	Bhatkal	Kaykini	yes	2123	5280	25.00	"
27	Bhatkal	Bengre	yes	2049	3989	35.00	"
28	Bhatkal	Hebale	yes	2438	4850	25.00	"
29	Sirsi	Badanagod	yes	1858	4582	25.00	"
30	Sirsi	Unchalli	yes	876	1960	20.00	"
31	Sirsi	Gudnapur	yes	1261	3360	25.00	"
32	Sirsi	Dodnalli	yes	1467	2040	30.00	"
33	Haliyal	Teragaon	yes	1457	3596	30.00	"

34	Haliyal	Murkawada	yes	945	3125	30.00	"
35	Haliyal	Sambrani	yes	747	2952	30.00	"
36	Haliyal	B,k halli	yes	1094	3941	35.00	"
37	Haliyal	Yadoga	yes	704	2689	35.00	"
38	Haliyal	Belvatagi	yes	713	2800	40.00	"
Total						**1343.00**	"

14.3 Dakshina Kannada:

Sl No	**Name of the District**	**Name of the Taluk**	**Name of the Gram Panchayaths**	**Population**	**House holds**	**Quantum of waste generation**	**Land details**	**Estimated amount (in lakhs)**
1	Dakshina Kannada	Bantwala	Pajiru	6550	1813	3.5 Tonnes	It is proposed to process / manage the waste collected from all 4 GPs in a cluster method by constructing a yard at one location	150
2		Mangalore	Konaje	11368	2789	4 Tonnes		
3			Harekala	7078	1512	3 Tonnes		
4			Pavooru	6160	1460	2 Tonnes		

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